

NATIONAL TRAINING CENTER AND FORT IRWIN

Universe
Technologies, Inc.
Frederick, MD

Gene Stout and
Associates
Loveland, CO

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN 2001-2005



Natural and Cultural Resources Section
Environmental Division
Directorate of Public Works



INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

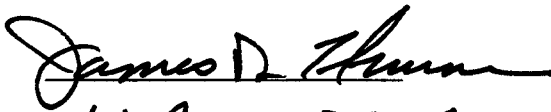
NATIONAL TRAINING CENTER AND FORT IRWIN, CALIFORNIA

APPROVAL

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 U.S.C. 670a *et seq.*) as amended.

James D. Thurman
Brigadier General, U.S. Army
National Training Center and Fort Irwin
Fort Irwin, California

Date


14 Aug 2001

Michael J. Spear
Director
Region 1, U.S. Fish and Wildlife Service
Portland, Oregon

Date

C. F. Raysbrook
Director
California Department of Fish and Game
Sacramento, California

Date

Geoffrey D. Miller
Major General, U.S. Army
FORSCOM Deputy Chief of Staff

For Personnel and Installation Management Date



INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

NATIONAL TRAINING CENTER AND FORT IRWIN, CALIFORNIA

PREPARED BY

Universe Technologies, Inc.
9 East Second Street, Suite 1
Frederick, MD 21701

Gene Stout and Associates
4307 Crane Court
Loveland, CO 80537

National Training Center and Fort Irwin REVIEW

W. M. Quillman - Natural and Cultural Resources Manager, Directorate of Public Works
Wayne Johnson - Integrated Training Area Management Program Manager, G3 Training
LTC Edward C. Gully - Director, Public Works
LTC Robert M. Algermissen - Garrison Commander

Commander, NTC & Fort Irwin
Directorate of Public Works
ATTN: AFZJ-PW-EV, PO Box 105097
Fort Irwin, CA 92310-5097

FORCES COMMAND REVIEW

Dr. Albert Bivings, Wildlife Biologist
Stuart M. Cannon, Forester

HQ, USAFORSCOM
ATTN: AFPI-ENE
Fort McPherson, GA 30330-6000

Ted Reid, Integrated Training Area
Management Coordinator

HQ, USAFORSCOM
ATTN: AFOP-TE
Fort McPherson, GA 30330-6000

PREFACE

World-Class Training for the World's Best Army- Now and for the 21st Century

- The National Training Center and Fort Irwin, California... the world's premier battlefield training installation.
- The National Training Center and Fort Irwin, California... home of some of the most fragile plant and wildlife communities in the nation and a keystone of the Mojave Desert ecosystem.

The NTC & Fort Irwin has two missions: training troops to win on battlefields around the globe and conserving natural resources. The National Training Center and Fort Irwin is proving that the two missions are compatible.

The U.S. Army's National Training Center has been providing the world's most realistic, bloodless training battlefields since its inception in 1979. As proven in the Mideast deserts, training received at the NTC and Fort Irwin trains soldiers, other members of the U.S. Armed Forces, and its allies in skills needed to protect the American way of life. The mission of Fort Irwin has changed over the past six decades... anti-aircraft, armor, mechanized, and today's total battlefield training. However, training opportunities at the National Training Center and Fort Irwin are world-class today, even better than the superb training over past decades.

Imagine over 600,000 acres with only seven year-round sources of water... incredibly, habitat for an unbelievably complex ecosystem with countless plant and animal species. Fort Irwin is a major player in the Mojave Desert Ecosystem Program and other regional initiatives. Some species found there are known from nowhere else in the world.

This Integrated Natural Resources Management Plan is the National Training Center and Fort Irwin's plan of action for the conservation of natural resources entrusted to the U.S. Army. The plan is for a five-year period, but the philosophy behind it is for a much longer period of time. The Training Center will conserve its biological diversity and make sound decisions regarding the use of natural resources to support the military mission and needs of the region and the nation.

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

NATIONAL TRAINING CENTER AND FORT IRWIN, CALIFORNIA

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EXECUTIVE REPORT

*"We do not own this land; we are caretakers of the land and the plant and animal species that inhabit it. The American people entrust the land to our care, and we shall fulfill their trust. We shall conserve and protect these resources for the future."*¹

Purpose

This Integrated Natural Resources Management Plan (INRMP) guides implementation of the natural resources program on the National Training Center and Fort Irwin, California (hereinafter called the NTC & Fort Irwin or Training Center) from 2001 through 2005. The program conserves the NTC & Fort Irwin's land and natural resources and helps ensure compliance with environmental laws and regulations. The INRMP also helps ensure the maintenance of quality training lands to accomplish the NTC & Fort Irwin's critical military mission on a sustained basis and to ensure that natural resource conservation measures and Army activities on mission land are integrated and consistent with federal stewardship requirements.

Environmental Compliance

Preparation and implementation of this INRMP are required by the Sikes Act (16 U.S.C. 670a *et seq.*), Department of Defense Instruction 4715.3 (*Environmental Conservation Program*), Army Regulation 200-3 (*Natural Resources - Land, Forest, and Wildlife Management*), and Army Memorandum (21 March 1997), *Army Goals and Implementing Guidance for Natural Resources Planning Level Survey (PLS) and Integrated Natural Resources Management Plan (INRMP)*. This INRMP was prepared using *Guidelines to Prepare Integrated Natural Resources Management Plans for Army Installations and Activities* (U.S. Army Environmental Center, 1997), as modified by Forces Command². This INRMP helps the NTC & Fort Irwin comply with other federal and state laws, most notably laws associated with environmental documentation, wetlands, endangered species, air quality, and wildlife management in general. This plan describes how the NTC & Fort Irwin will implement provisions of AR 200-3 and local regulations, principally NTC Reg. 200-1 (*Environmental Protection and Enhancement at NTC*), NTC Reg. 420-3 (Hunting), and portions of NTC Reg. 350-3 (*Range Regulation*).

This INRMP has the signatory approval of the U.S. Fish and Wildlife Service. This signature approval includes agreement that the INRMP complies with the Endangered Species Act. Review of the INRMP is informal consultation with regard to the Endangered Species Act.

¹ Robert M. Walker, Assistant Secretary of the Army, Testimony before Congress, July 11, 1995.

² FORSCOM Memorandum. 26 June 97. Guidelines to Prepare Integrated Natural Resource Management Plans (INRMPs) for Army Installations and Activities.

The Sikes Act, as amended in November 1997, requires that INRMPs include:

- wildlife management, land management, and wildlife-oriented recreation;
- fish and wildlife habitat enhancement or modifications;
- wetland protection, enhancement, and restoration where necessary to support fish, wildlife, or plants;
- integration of, and consistency among, the various activities conducted under the INRMP;
- establishment of specific natural resource management goals and objectives and time frames for proposed actions;
- sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources;
- public access to the military installation that is necessary or appropriate for sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security;
- enforcement of applicable natural resource laws;
- no net loss in the capability of military installation lands to support the military mission of the installation;
- regular review of this INRMP and its effects, not less often than every five years;
- exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars; and
- priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish and wildlife.

The INRMP will address compliance with the following additional legal mandates:

National Environmental Policy Act of 1969
Endangered Species Act of 1973
National Historic Preservation Act of 1966 (as amended through 1992)
Archaeological Resources Protection Act of 1979
American Indian Religious Freedom Act of 1978
Native American Graves Protection and Repatriation Act of 1990
Federal Noxious Weed Act of 1974
Clean Water Act of 1978
Clean Air Act (as amended through 1990)
Federal Insecticide, Fungicide, and Rodenticide Act
Protection of Wetlands, 1977, Executive Order 11990
Migratory Bird Treaty Act
Executive Order 13112, Invasive Species

Scope

The INRMP will provide the basis and criteria for protecting and enhancing natural resources using watershed, landscape, and ecosystem perspectives, consistent with the military mission. The INRMP defines the level of management and provides the vehicle by which the Army participates in developing regional planning efforts under the West Mojave Coordinated Management Plan. Fort Irwin contains ecotypes representative of neighboring ecosystems and is at a crossroads for the transmission of genetic material among populations. Thus, Fort Irwin is central to the Mojave Desert ecosystem.

Provisions of the INRMP apply to each directorate, command, and tenant unit at the NTC & Fort Irwin (including the Active Army, Army National Guard, Army Reserve Component, contractors (government and private), private groups, spouses and dependents, and individuals who either directly or indirectly use the installation's natural resources) as well as rotational commands, units, and outlying detachments of personnel assigned or attached to the installation. This INRMP is an integral part of the NTC & Fort Irwin Installation Master Plan.

Relationship to the Military Mission

Fort Irwin has been used for antiaircraft, armored, and mechanized training for regular Army and National Guard units since 1940. Fort Irwin was selected as the National Training Center for the U.S. Army in 1979. The NTC provides the critical edge in training brigade-level units in highly realistic combat situations. This facility is unique in the world and played a major role in the development of tactics and the training used successfully in Operation Desert Storm.

Battlefields, landing fields, target arrays, logistics corridors, storage areas, ranges, support areas, and safety buffer areas on the Training Center comprise a bloodless laboratory where American Army forces can test both soldiers and equipment to practice and perfect the principles of engagement for tomorrow's armed conflict. The area is also habitat for over 500 species of Mojave Desert plants and home to hundreds of species of animals. This document defines the constituents and establishes the methods by which natural resources management will be accomplished along with the military mission. The NTC & Fort Irwin military mission requires quality training lands which involves considerable interaction with the installation's natural resources.

This INRMP supports the military mission by protecting and enhancing training lands upon which the mission is critically dependent. The INRMP also describes recreational opportunities associated with natural resources to the NTC & Fort Irwin community, thus supporting the Army commitment to both Quality of Life and Communities of Excellence programs.

The INRMP describes impacts of the military mission upon natural resources and means to mitigate these impacts. However, this INRMP does not evaluate the NTC & Fort Irwin's military mission, nor does it replace any requirement for environmental documentation of the military mission at the Training Center.

Partnerships

This document was prepared in partnership and cooperation with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG), representing the federal and state wildlife regulatory agencies, respectively. Additionally, because of their involvement in the preparation of the West Mojave Coordinated Management Plan, the Bureau of Land Management (BLM) played a significant role in data procurement, management assistance, and consultation in the production of this INRMP. Other partners in this effort include universities and other federal and state agencies.

Much data and information within this INRMP was compiled through the efforts of personnel associated with the Integrated Training Area Management (ITAM) program and Mojave Desert Ecosystem Program (MDEP). Implementation of projects contained herein, as well as the need for additional data to better define species ranges and impacts of military actions, will require the continued cooperation and assistance from

ITAM and MDEP personnel.

Neighboring Department of Defense installations (Edwards Air Force Base, Marine Corps Air Ground Combat Center at Twenty-nine Palms, Marine Corps Logistics Base at Barstow, and Naval Air Weapons Station at China Lake) provided advice, information, and suggestions to improve the document and resulting management strategies to improve ecosystem-wide segments of the INRMP. Finally, the natural resource, real property management, and mission operations staffs of U.S. Army Forces Command, Fort McPherson, GA provided information and guidance to ensure the adequacy of the INRMP.

Planned Major Initiatives

This INRMP includes a description of ongoing and planned natural resources programs and projects at NTC & Fort Irwin. Most of these will either be continued or completed. The most significant projects within this INRMP include:

- rehabilitating and protecting lands to support military training;
- implementing an ecosystem management philosophy that provides biodiversity conservation;
- support from the Integrated Training Area Management (ITAM) program;
- monitoring flora, fauna, soils, and water quality;
- implementing a geographic information system to allow better decisions regarding use and management of NTC & Fort Irwin natural resources;
- protection of sensitive natural resources areas;
- managing endangered species and their habitats to ensure compliance with the Endangered Species Act;
- restoring eroded lands and affected habitats;
- providing an effective integrated pest management program;
- protecting and conserving wetlands;
- informing soldiers and other members of the NTC & Fort Irwin community of the value of installation natural resources and means to conserve those resources;
- implementing a comprehensive outdoor recreation program;
- protecting cultural resources while conducting natural resources management; and
- using National Environmental Policy Act (NEPA) to conserve natural resources.

Monitoring INRMP Implementation

The INRMP will be evaluated through monitoring programs, including the Environmental Compliance Assessment System, Army Compliance Testing System, and annual reviews by Forces Command (FORSCOM) and other interested parties. The list of INRMP goals and objectives in Appendix 16.4 can provide a basis for evaluating plan implementation.

The success of individual programs included in the INRMP will be evaluated by the effectiveness of programs in question. For example, the raven control program will be evaluated by the reduction in numbers of ravens in the landfill as well as the reduction in the amount of raven predation of desert tortoises in the wild. The ITAM program will be evaluated by the effectiveness of individual component programs.

Costs and Benefits

- **Costs:** This INRMP will cost about \$25,104,000 for FY 01 - FY 05 to implement. Funding will be primarily from environmental funds and training funds designated for implementation of the ITAM program.
- **Military Mission Benefits:** Implementation of this INRMP will maintain the quality of training land. It will enhance mission realism through the perpetuation of more realistic training lands. It will reduce maintenance costs and improve health and safety and the ability for long range planning at the NTC & Fort Irwin.
- **Environmental Benefits:** The INRMP provides the basis for the conservation and protection of natural resources. It will help reduce vegetation loss and soil erosion due to military activities. It will reduce the potential for environmental pollution. It will provide biodiversity conservation. Plan implementation will increase overall knowledge of the operation of the NTC & Fort Irwin ecosystem through surveys and research.
- **Other Benefits:** Troop environmental awareness will be enhanced while training at the NTC & Fort Irwin. Both community relations and the NTC & Fort Irwin's environmental image, internal and external to Defense, will be enhanced. Quality of life for the NTC & Fort Irwin community will be improved. INRMP implementation will decrease long term environmental costs and reduce personal and installation liabilities from environmental noncompliance.

Summary

The INRMP outlines steps required to meet Department of Defense, U.S. Army, and Fort Irwin's legal and moral obligations to provide for the stewardship of the natural resources on the NTC and Fort Irwin while enabling the accomplishment of the military mission. The INRMP has been generated through cooperation with appropriate regulatory agencies. As a public document, it will support and perpetuate the military mission while fostering stewardship and goodwill for the NTC & Fort Irwin, the U.S. Army, and the Department of Defense throughout the Mojave Desert ecosystem.

1.0 GOALS, COMPLIANCE, STRATEGIES, AND COOPERATIVE PROGRAMS

Army Environmental Vision Statement

The Army will be a national leader in environmental and natural resource stewardship for present and future generations as an integral part of our mission³.

The Army's commitment to natural resources management is reflected in the U.S. Army Environmental Strategy into the 21st Century, which focuses on responsibly managing Army lands to ensure long-term natural resource productivity so the Army can achieve its mission. This Army commitment to natural resources management is emphasized in Army Regulation 200-3 (*Natural Resources - Land, Forest, and Wildlife Management*), which requires that Integrated Natural Resources Management Plans be developed and maintained for all Army installations.

This chapter discusses NTC & Fort Irwin overall strategies for managing natural resources as part of the installation mission. These are discussed in local, regional, and national contexts. Additionally, the chapter discusses the overall integration of NEPA documentation within this INRMP.

The Command and staff of the NTC & Fort Irwin are committed to environmental stewardship as an integral part of the mission at Fort Irwin. This commitment is evidenced by support of past environmental programs and their full support of this Integrated Natural Resource Management Plan.

It is important to understand the relationship between the natural resources program and the NTC & Fort Irwin as a whole. A comparison of NTC & Fort Irwin mission, vision, goals, and core values with the mission, goals, and objectives of the natural resources program helps identify this relationship.

1.1 The NTC Mission, Vision, Goals, and Core Values⁴

Mission

Provide tough, realistic, joint and combined arms training focused at the battalion task force and brigade level, to assist commander in developing trained, competent leaders and soldiers, while preparing units for success on the modern battlefield. Identify unit training deficiencies and provide necessary feedback to improve the force. Take care of soldiers, civilians, and family members. Keep pace with Army Transformation.

³ Army Environmental Policy Institute. 1992. *U.S. Army Environmental Strategy into the 21st Century*. U.S. Government Printing Office 1993-747-677, 38 p.

⁴ *Fort Irwin, The National Training Center*, a color brochure provided by the Public Affairs Office, NTC & Fort Irwin, CA.

Vision

The National Training Center and Fort Irwin is an enduring installation dedicated to provide a realistic training environment focused on honing warfighting skills of soldiers and leaders in a force projection army for the 21st Century battlefield, while providing quality of life for soldiers, civilians, and family members.

Goals

- Train the force.
- Develop the National Training Center as a realistic training environment and an enduring installation.
- Provide quality of life for the entire Fort Irwin community.

Core Values

World-Class Training for the World's Best Army- Now and for the 21st Century

- Customer Service
- Standards
- Learning Environment
- Professional Competency
- Stewardship
- Sense of Community

1.2 NTC & Fort Irwin Natural Resources Mission, General Goals, and General Objectives

Mission

Provide professional management and stewardship of natural resources at the National Training Center and Fort Irwin while providing opportunities for multiple compatible uses of natural resources, complying with environmental laws and supporting the military mission.

Below are general NTC & Fort Irwin natural resources goals and objectives used to attain them. These objectives, and those more specific in chapters 8-14, serve as a checklist to monitor the success of the INRMP. Some objectives fit more than one category. When this occurs, the most-fitting category was chosen.

Goal 1. Provide quality natural resources as a critical training asset upon which to accomplish the military mission of the NTC & Fort Irwin.

Objective 1. Ensure no net loss in the capability of installation lands to support existing and projected military training and operations on the NTC & Fort Irwin.

Objective 2. Maintain quality training lands through range monitoring and damage minimization, mitigation, and rehabilitation (*i.e.*, execution of the Integrated Training Area Management program).

Goal 2. Comply with laws and regulations that pertain to management of NTC & Fort Irwin natural resources.

Objective 1. Manage natural resources within the spirit and letter of environmental laws, particularly the Sikes Act upon which this INRMP is predicated.

Objective 2. Protect, restore, and manage sensitive species and wetlands.

Objective 3. Use procedures within the National Environmental Policy Act (NEPA) to make informed decisions that include natural resources considerations and mitigation.

Objective 4. Ensure NTC & Fort Irwin's natural resources program is consistent with the protection of cultural and historic resources.

Objective 5. Implement this INRMP within the framework of Army policies and regulations.

Objective 6. Protect and manage threatened and endangered species and critical habitat in accordance with the Endangered Species Act, NEPA, AR 200-3, DoD Directive 4715.3, USFWS regulations and agreements, and other applicable laws or guidance from higher headquarters. Consider species listed by the State of California in the natural resources management program, and comply with the California Environmental Quality Act (CEQA).

Goal 3. Manage natural resources on the NTC & Fort Irwin to assure good stewardship of public lands entrusted to the care of the Army.

Objective 1. Use adaptive ecosystem management strategies to protect, conserve, and enhance native fauna and flora.

Objective 2. Monitor and manage soils, water, vegetation, and wildlife on the NTC & Fort Irwin with a consideration for all biological communities and human values associated with these resources.

Objective 3. Manage leased lands (*i.e.*, the Goldstone Complex) to protect and enhance their natural resources.

Objective 4. Ensure the NTC & Fort Irwin natural resources program is coordinated with installation organizations, other agencies, and conservation organizations with similar interests.

Goal 4. Improve the quality of life of the Fort Irwin community through quality natural resources-based recreation opportunities.

Objective 1. Provide opportunities for outdoor recreation, such as hunting, picnicking, camping, nature study, equestrian activities, etc.

Objective 2. Provide conservation education opportunities.

1.3 Support of Installation Goals

Implementation of this INRMP will support the mission, vision, goals, and core values of the NTC & Fort Irwin. The natural resources/ITAM team at the NTC & Fort Irwin is committed to supporting the military mission, providing stewardship of resources entrusted to the Army, enhancing the quality of life of the Fort Irwin community, and being a valued member of the overall NTC & Fort Irwin team. Implementation of this INRMP will demonstrate those qualities.

1.4 Compliance Requirements

DoD Instruction 4715.3 and AR 200-3 require that integrated natural resource management plans be developed and maintained for DoD and Army lands. Other pertinent regulations and legislation relevant to natural resources management are listed below.

| | |
|----------------------------|---|
| Public Law 85-624 | Fish and Wildlife Coordination Act |
| Public Law 96-561 | Fish and Wildlife Conservation and Natural Resource Management Programs on Military Reservation: Amends Public Law 86-797 (Sikes Act) |
| Public Law 94-579 | Federal Land Policy and Management Act of 1976 |
| Public Law 89-669 | Fish and Wildlife Conservation Act |
| Public Law 90-465 | Conservation Programs on Military Reservations |
| Public Law 93-205 | Endangered Species Act of 1973, as amended |
| Public Law 95-632 | Endangered Species Act of 1973 (1978 amendments) |
| Public Law 86-70 | Bald Eagle Protection Act, as amended |
| Public Law 93-366 | Non-game Act |
| Public Law 91-190 | National Environmental Policy Act |
| Public Law 92-522 | Federal Water Pollution Control Act Amendments of 1972 |
| Public Law 90-583 | Noxious Plant Control Act |
| Public Law 93-629 | Federal Noxious Weed Act of 1973 |
| Public Law 93-452 | Conservation and Rehabilitation Program on Military and Public Lands |
| Public Law 93-408 | Youth Conservation Corps Act of 1972, amended |
| Public Law 95-524 | Comprehensive Employment and Training Act Amendments 1978 |
| Title 16 U.S. Code 703-711 | Migratory Bird Species Act |
| Title 10 U.S. Code 2667 | Leased, Non-excess Property |
| Title 10 U.S. Code 2671 | Military Reservations and Facilities |
| Title 16 U.S. Code 590 | Soil Conservation |
| Title 16 U.S. Code 1271 | National Trails System Act of 1968 |
| Executive Order 11991 | Protection and Enhancement of Environmental Quality: |

Executive Order 11989
Executive Order 12608
Executive Order 13045

Executive Order 13112
DoD Instruction 4715.3
DoD Directive 6050.2
DoD Instruction 5000.13
AR 200-1
AR 200-2
AR 200-3
AR 350-4
NTC Reg. 200-1
NTC Reg. 350-3
NTC Reg. 420-3

Amends Executive Order 11514
Off-Road Vehicles on Public Lands
Protection of Wetlands: Amends Executive Order 11990
Protection of Children from Environmental Health Risks and Safety Risks
Invasive Species
Environmental Conservation Program
Use of Off-Road Vehicles on DoD Lands
Natural Resources
Environmental Protection and Enhancement
Environmental Effects of Army Action (NEPA)
Natural Resources, Land, Forest, and Wildlife Management:
Integrated Training Area Management (ITAM)
Environmental Protection and Enhancement at NTC
Range Regulation
Hunting

The California Environmental Quality Act (CEQA) is a state law requiring public agency decision-makers to document and consider the environmental implications of their actions. CEQA applies to all government agencies in California, including the NTC & Fort Irwin. Unlike NEPA, CEQA is not a procedural statute. It contains substantive provisions requiring agencies to deny approval of a project with significant adverse effects when feasible alternatives or feasible mitigation measures can substantially lessen such effects.

1.5 Biodiversity Conservation and Ecosystem Management

Biological diversity (biodiversity) refers to the variety and variability among living organisms and the environment in which they occur. Biodiversity has meaning at various levels including ecosystem diversity, species diversity, and genetic diversity. The Department of Defense has developed *A Department of Defense (DoD) Biodiversity Management Strategy* (The Keystone Center, 1996). This Strategy identifies five reasons to conserve biodiversity on military lands:

- (1) **sustain natural landscapes** required for the training and testing necessary to maintain military readiness;
- (2) **provide the greatest return on the Defense investment** to preserve and protect the environment;
- (3) **expedite the compliance process** and help avoid conflicts;
- (4) **engender public support** for the military mission; and
- (5) **improve the quality of life** for military personnel.

The Keystone Center report (1996) notes that the challenge is “to manage for biodiversity in a way that supports the military mission”. This strategy identifies the INRMP as the primary vehicle to implement biodiversity protection on military installations. The model process developed within the strategy includes the following principles:

- support the military mission;
- use joint planning between natural resources managers and military operations personnel;
- integrate biodiversity conservation into INRMP, ITAM, and other planning protocols;
- involve internal and external stakeholders up front;

- emphasize the regional (ecosystem) context;
- use adaptive management;
- involve scientists and use the best science available; and
- concentrate on results.

The Department of Defense (DoD Instruction 4715.3, *Environmental Conservation Program*) describes ecosystem management as, “a process that considers the environment as a complex system functioning as a whole, not a collection of parts, and recognizes that people and their social and economic needs are a part of the whole”. The Department of Defense goal with regard to ecosystem management is, “To ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations.”

U.S. Army Forces Command (FORSCOM) has published an ecosystem management policy⁵ which expands on Department of Defense principles and guidelines. Some important policies applicable to the NTC & Fort Irwin include:

- Emphasize native plants, especially indicator species (e.g. endangered species).
- Planning should be at the land association or land type scale while management should be at the training area or watershed scale. Care should be taken to prevent creation of island populations which deplete gene pools.
- Commodity production shall be a tertiary consideration. Primary goals are to support the military mission while protecting endangered species and their habitat.
- It is critical to establish a regional consortium of all potentially affected parties.
- Adaptive management is a critical aspect of ecosystem management.
- The installation Master Plan must serve as the umbrella plan for integration of all other installation plans, including the INRMP.
- None of the current conservation management tools are to be categorically excluded from use.

The NTC & Fort Irwin will use ecosystem management to guide its program in the next five years and beyond. This management strategy enables the installation to conduct military training while conserving natural resources upon which the quality of training ultimately depends. Adaptive management is an important component of ecosystem management. Adaptive management involves implementing the best option, testing that option's results, and modifying implementation accordingly.

1.6 Regional Cooperative Programs

The following regional land use or planning initiatives potentially influence natural resources management at the NTC & Fort Irwin:

⁵ FORSCOM Policy Memorandum 200-97-1, 1997, *Implementation of Ecosystem Management*.

Desert Tortoise Recovery Plan. The desert tortoise (*Gopherus agassizii*) was listed as a threatened species in April 1990. The recovery plan outlining actions needed to recover and protect the species was finalized in 1994. The USFWS designated critical habitat for the desert tortoise in 1995. In 1993, 25,000 acres on the NTC & Fort Irwin were placed off-limits due to presumed high levels of desert tortoise. In 1995 this area was designated as critical habitat.

California Desert Conservation Area Plan. Section 601 of the Federal Land Policy and Management Act of 1976 requires the BLM to develop a plan for long-term protection and administration of public lands in the California desert. FLPMA requires this plan, called the California Desert Conservation Area Plan, to take into account multiple use management and sustained yield principles in providing for resource use and development, including maintenance of environmental quality, rights-of-way, and mineral development. The California Desert Conservation Plan was finalized in 1980 and establishes general guidance for management of all BLM-administered lands in the California desert (Bureau of Land Management, 1997).

West Mojave Coordinated Management Plan. The West Mojave Coordinated Management Plan is a comprehensive, interagency planning effort for the conservation of biological resources in the West Mojave region. In 1992 agencies within the West Mojave planning area established a multi-agency team for preparing this plan with BLM designated as the lead agency. The West Mojave Coordinated Management Plan is a cooperative effort involving many different agencies:

- five military installations (NTC & Fort Irwin, Naval Air Weapons Station China Lake, Edwards Air Force Base (AFB), Marine Corps Logistics Base in Yermo, and Marine Corps Air Ground Combat Center Twenty-nine Palms);
- five federal managers (BLM, National Aeronautics and Space Administration Goldstone Deep Space Communication Complex, National Park Service (NPS), U.S. Geological Survey (USGS) Biological Resources Division, and Boron Prison);
- six State of California agencies (Department of Transportation, Energy Commission, CDFG, Department of Parks and Recreation, State Lands Commission, and the University of California Reserve System);
- one special district (Indian Wells Valley Water District);
- five counties (Inyo, Kern, Los Angeles, Riverside, and San Bernardino); and
- 11 incorporated towns and cities (Adelanto, Apple Valley, Barstow, California City, Hesperia, Lancaster, Palmdale, Ridgecrest, Twenty-nine Palms, Victorville, and Yucca Valley).

The West Mojave Coordinated Management Plan⁶ will provide a consistent and streamlined regional program for compliance with the California and federal endangered species acts. Products of the West Mojave Plan will be programmatic incidental take permits and biological opinions, as appropriate, issued to participating cities, counties, and state and federal agencies by the CDFG and the USFWS. Incidental take permits and biological opinions will set forth a program for mitigating and minimizing impacts to species listed as endangered, threatened, or rare under the California Endangered Species Act and the federal Endangered Species Act. Each incidental take permit or biological opinion will identify choices of mitigation measures which can be implemented by project proponents seeking discretionary permits from the

⁶ Memorandum: Steering Committee Meeting; Proposed Task Group Process, to Steering Committee from Bill Haigh, Project Manager, August 14, 1998.

participating agencies. Plants and animals for which such measures and/or fees are required are to be covered by the West Mojave Plan.

The West Mojave Plan is also developing measures to mitigate impacts to unlisted plants and animals. These can be adopted by participating agencies through the mechanism of pre-listing agreements. An agency which executes a pre-listing agreement with CDFG or USFWS is assured that in the event the species is later listed, no additional measures (barring unforeseen circumstances) will need to be adopted. From the time the pre-listing agreement is executed, the species involved receives coverage from CDFG and/or USFWS.

DoD installations in the West Mojave will support the West Mojave Coordinated Management Plan to the extent that it does not conflict with the military mission. Natural resources management decisions made by the NTC & Fort Irwin will be influenced by opinions of regional agencies, but implementation of the INRMP is the compliance requirement for Defense installations with regard to natural resources planning and implementation.

Northern and Eastern Mojave Planning Effort. The Northern and Eastern Mojave Planning Effort will provide a regional perspective for the management of federal lands and will update agency-specific management plans to reflect changes made by the California Desert Protection Act of 1994. The Northern and Eastern Mojave interagency planning team consists of representatives from the National Park Service, BLM, and USFWS. Cooperating agencies include the Bureau of Indian Affairs; NTC & Fort Irwin; Naval Air Weapons Station China Lake; U.S. Army Corps of Engineers; U.S. Environmental Protection Agency; CDFG; California State Parks; California Department of Transportation; State Lands Commission; California State Historic Preservation Office; Nevada State Historic Preservation Office; San Bernardino, Inyo, and Mono counties in California; Clark, Nye, and Esmeralda counties in Nevada; and the Timbisha/Shoshone, Mojave, and Chemehuevi Native American Tribal Councils. Management plan alternatives and an EIS analyzing these alternatives will be prepared concurrently. Scoping meetings for this effort were held in May 1997. The schedule as of June 1997 identifies a distribution date for the final EIS in September 2000 (Bureau of Land Management, 1997).

The Training Center's eastern boundary is the western boundary of the Northern and Eastern Mojave Planning Effort. Thus, if land expansion proceeds eastward, as described in the EIS (U.S. Army Corps of Engineers, Los Angeles District, 1996), the NTC & Fort Irwin will become an active partner in this project. The proposed land expansion is discussed in Section 2.2.

Mojave Desert Ecosystem Program. The Mojave Desert Ecosystem Program (MDEP) is a regional planning program in the Mojave Desert. Objectives of the program are to connect environmental databases at the five military installations in the Mojave Desert with those residing at various Department of the Interior; other federal land agencies; and regionally associated state, county, and local government agencies, academic institutions, and private organizations. The ecosystem database will be maintained on a Geographic Information System (GIS). Participants in the MDEP are:

- Department of Defense: NTC & Fort Irwin, Naval Air Weapons Station China Lake, Edwards AFB, Nellis AFB, MCAGCC Twenty-nine Palms, and Marine Corps Logistics Base at Barstow; and
- Department of Interior: BLM, National Park Service, USFWS, USGS Biological Resources Division (formerly the National Biological Service), U.S. Bureau of Mines.

California Desert Manager's Group. The California Desert Manager's Group meets quarterly. The MDEP DoD Coordinator is the co-chair and a voting member of this Group. This Group originated as part of the California Innovative Laboratory with membership from each BLM District and each National Park. Military participation was invited when the MDEP (then an Initiative) was formed under the DoD.

1.7 Integrated Training Area Management

Integrated Training Area Management (ITAM) is an Army-wide program to provide quality training environments to support the Army's military mission. The ITAM program was initiated with the realization that Army training lands were being degraded to the point where their capabilities to sustain military missions were in jeopardy. Proper management to support both the military mission and other multiple-use activities is a challenge unique among other managers of public lands.

A geographic information system (GIS) was fielded at the NTC & Fort Irwin by the ITAM program in 1992. A GIS is an organized collection of computer hardware, software, spatial data, and personnel designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information. The ITAM GIS either has or is obtaining extensive data layers regarding NTC & Fort Irwin soils, surface hydrology, wildlife distribution, vegetation, transportation system, topography, archaeology, cultural resources, and special features involving natural resources management programs. ITAM also has data layers for all the military bases in the West Mojave.

The ITAM program at the NTC & Fort Irwin was begun in 1990 and was the responsibility of the Directorate of Public Works (DPW). In 1995 proponentcy of this program changed from DPW to G3-Training, consistent with Army-wide changes.

The ITAM program includes the following four component areas (modified from *Integrated Training Area Management (ITAM) Program Strategy* (Office of the Deputy Chief of Staff for Operations and Plans, 1995)):

- The Land Condition Trend Analysis (LCTA) component is used to inventory and monitor physical and biological resources to meet the multiple-use demands of the NTC & Fort Irwin. It incorporates a GIS to support planning decision processes to effectively manage land use and natural resources.
- The Training Requirements Integration (TRI) component integrates NTC & Fort Irwin military training requirements for land use with natural resources conditions and capabilities to support these requirements.
- The Environmental Awareness (EA) component improves land user understanding of the impacts of their activities on the environment.
- The Land Rehabilitation and Maintenance (LRAM) component includes programming, planning, designing, and executing land rehabilitation and maintenance to support and sustain the military mission.

As part of the ITAM budgetary and planning process, NTC & Fort Irwin has been designated a Category I installation. Category I installations are the largest installations, with most critical training missions, and with greatest environmental sensitivities to missions.

Goals and objectives specific to ITAM are found in the ITAM Program Strategy, Section 2.1 (Office of the

Deputy Chief of Staff for Operations and Plans, 1995). These are incorporated into objectives within this INRMP. ITAM program components are described in sections 8.1.1 - *Land Condition Trend Analysis*, 9.1 - *Coordinated Planning*, 9.8 - *Land Rehabilitation and Maintenance*, 9.13 - *Training Requirements Integration*, 11.1 - *Military Personnel Awareness*, and 16.3.2 - *Geographic Information System*. The NTC & Fort Irwin ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a) includes ITAM projects for FY 98 through FY 02.

1.8 INRMP and NEPA Integration

This INRMP includes an Environmental Assessment. This section describes the general layout of the integration of the INRMP with its NEPA documentation.

1.8.1 Purpose, Need, and Rationale

The NTC & Fort Irwin proposes to implement its Integrated Natural Resources Management Plan 2001-2005 at Fort Irwin, California. The purpose of the Environmental Assessment is to identify and evaluate environmental consequences of implementing the proposed plan, in accordance with NEPA, the Council on Environmental Quality regulations, and Army Regulation (AR) 200-2, *Environmental Effects of Army Actions*.

AR 200-2 is the regulation the Army uses to establish policy, procedures, and responsibilities for assessing environmental effects of Army actions. AR 200-2 specifically states that development of natural resource management plans requires preparation of an Environmental Assessment.

Department of Defense agencies have often prepared NEPA documentation for implementation of plans, including INRMPs, following development of such plans. This approach often results in repetition of effort, time delays, and increased cost. Council on Environmental Quality regulations allow NEPA documents to be combined with other agency documents to reduce paperwork and duplication (40 CFR 1506.4). These regulations encourage agencies to focus on the purpose of NEPA analysis - better decision-making.

To streamline this process and alleviate drawbacks associated with preparing separate documents, this INRMP and its associated NEPA analysis have been combined into a single document. This integration satisfies the requirements of AR 200-2 and AR 200-3, as well as supports the intent and spirit of NEPA. This combined INRMP/EA documents existing natural resources practices and can be used as an effective tool for future planning and decision making purposes.

A discussion of alternatives is within each section in Chapters 8 through 14. Each management program is discussed under the two contexts of the Proposed Action and Other Management Options. Environmental consequences of implementing this plan are in Chapter 17. The Finding of No Significant Impact (FONSI) is in Appendix 17.8.

1.8.2 Scope

The proposed action is restricted to implementation of the INRMP. Environmental effects of implementing this plan on the NTC & Fort Irwin are the focus of environmental assessment aspects integrated into this plan.

1.8.3 Impact Analysis

The analysis process involved the review of installation natural resources-related data collected by the NTC & Fort Irwin, other governmental agencies, and private organizations. The process involved interviews with NTC & Fort Irwin personnel involved with natural resources management, military mission planning, outdoor recreation, and installation maintenance.

1.8.4 Alternatives

There are issues that will not be considered in alternative analyses sections as they take precedence over almost all management options. First and foremost, NTC & Fort Irwin's military mission must not be compromised. Therefore, options, such as removing large valley-floor areas from maneuver training that would inhibit the installation from performing its mission, will not be considered. The exception would be the adoption of restrictions or alterations to standard operating procedures to comply with laws, such as the Endangered Species Act.

Second, the issues of safety and security must not be compromised. Safety and security are high priorities at the NTC & Fort Irwin and are directly related to maintaining the military mission. Therefore, management options, such as opening the Training Center to unrestricted access for hunting or off-highway vehicles will not be considered.

1.8.4.1 Proposed Action

The NTC & Fort Irwin proposes to fully implement its INRMP, 2001-2005 as partial mitigation for environmental effects of the military mission. This plan presents information on the management of natural resources on the NTC & Fort Irwin. It also describes the setting, defines land management units, and describes how these units will be managed to sustain ecological functions, protect endangered and other wildlife species, provide sustained military use, and support outdoor recreational uses. Major emphasis will be placed on proactive management to reduce the potential for negative environmental impacts due to the installation's military mission.

1.8.4.2 Compliance Alternative

The Compliance Alternative is to implement portions of the INRMP to maintain compliance with laws. Compliance with laws, such as the Endangered Species Act, Clean Water Act, and National Environmental Policy Act, would ensure implementation of some programs but would ignore other programs within the INRMP.

Passage of the Sikes Act in 1997 requires INRMPs to include programs such as fish and wildlife, land, and forest management; fish-and wildlife-oriented recreation; fish and wildlife habitat management; sustainable public use of natural resources; etc. (see Executive Report). The Sikes Act further requires implementation of programs identified within the INRMP. Therefore, each program within the INRMP is compliance driven. Thus, the compliance alternative is not viable as it is identical to the Proposed Action of full implementation of the INRMP. This alternative will not be further discussed in analysis sections.

1.8.4.3 Other Management Options

Virtually every major natural resources program at the NTC & Fort Irwin (wildlife, ITAM, pest management, etc.) has many options other than ones selected for the INRMP. For example, there are many different strategies with regard to desert ecosystem rehabilitation, just as there are numerous options for monitoring training lands and a wide variety of wildlife water devices. As inherent with integrated programs, many of these interact with each other. For example, changing the fire protection policy from 100% protection to let-burn would drastically affect vegetative and faunal resources, and impacts would be different among plant and animal species.

Possible options create almost countless potential combinations, each of which could be an alternative to the proposed action. Various laws, compliance documents, Army regulations, etc. prohibit the implementation of many of these possibilities. For example, intensive training on critical habitat is not a viable option due to public law and Department of Army policy. On the other hand, selecting management techniques for rehabilitating damaged land is an option, and there are many choices. The same would be true of changing the monitoring program for vegetation condition trends or changing the wildlife water program.

This Other Management Options alternative will be discussed as the alternative action following each management section. Environmental Assessments do not focus on alternatives as much as Environmental Impact Statements. Thus, discussions will often be somewhat general and brief.

1.8.4.4 No Action

The No Action alternative would be to not manage natural resources on the NTC & Fort Irwin. This is not a viable alternative. Laws and executive orders on endangered species, water quality, federal land management, outdoor recreation, wetlands, etc., as well as Department of Defense and Department of Army policies, preclude the No Action alternative. This alternative will not be further discussed.

2.0 LOCATION AND ACREAGE

2.1 Location and Neighbors

The NTC & Fort Irwin is located in the central Mojave Desert approximately 38 miles northeast of Barstow in San Bernardino County, California (Figure 2.1). The installation is bordered on the west by China Lake Naval Air Weapons Station, Death Valley National Park and a small strip of BLM land on the north, BLM wilderness study areas on the east, and the Silurian Valley and Alvord Mountains on the south. The land to the south is mostly BLM land with small, interspersed parcels of privately owned land. Fort Irwin Road is the only paved road that provides access to the NTC, intersecting with Interstate 15 about 37 miles (59.5 km) to the south. Interstate 15 provides the major east-west travel route linking Los Angeles and Las Vegas. The majority of Fort Irwin's civilian work force resides in Barstow and the City of Yermo to the east of Barstow.

2.2 Acreage, Acquisition, and Proposed Expansion

Through the years Congress has continued to acquire the lands making up present-day Fort Irwin from public and private use. The NTC & Fort Irwin occupies 642,731 acres (260,105 hectares).

Of this acreage, 312,727 acres (48.7% of the total) are not available for military maneuver, the most critical factor within of the Training Center military mission. The following areas are not available for maneuver (U.S. Army, NTC & Fort Irwin, 1997a):

| | | |
|------------------------------|---------------|--------------------|
| Leach Lake Gunnery Range | 92,625 acres | (37,484 hectares) |
| Goldstone Complex | 33,241 acres | (13,452 hectares) |
| Cantonment Area | 15,314 acres | (6,197 hectares) |
| Non-trafficable (>20% slope) | 139,631 acres | (56,507 hectares) |
| Environmental off-limits | 21,500 acres | (8,701 hectares) |
| Archeological off-limits | 3,250 acres | (1,315 hectares) |
| Recreational Area | 7,166 acres | (2,900 hectares) |
| Total | 312,727 acres | (126,556 hectares) |

As the world's premier military training center, the NTC & Fort Irwin mission is to provide tough, realistic training to battalion task force-sized heavy, medium, and light units. The Army proposed (U.S. Army Corps of Engineers, Los Angeles District, 1996) to expand the NTC by acquiring approximately 331,217 acres (132,487 hectares) of public, private, and state land to the east and north of its existing boundaries.

The description of the need for additional training areas and the summary of military doctrine are contained in Chambers Group, Inc. (1992a). The results of a Land Use Requirement Study (LURS) conducted by the Army in 1985 indicated that an additional 238,000 net maneuverable acres (95,000 hectares) were needed at the NTC & Fort Irwin to train brigade-sized combat units. A subsequent LURS in 1993 indicated that 222,000 net maneuverable acres (88,800 hectares) were needed. The Army considers maneuverable acres to be lands with slopes of less than 20 percent. Because lands surrounding the Training Center include a large portion of mountainous terrain, the Army has proposed to acquire a larger area than that recommended in the LURS. The total area of the proposed expansion is 331,217 acres (132,486 hectares), of which 277,244

acres (110,898 hectares) are not maneuverable (less than 20 percent slope). The proposed expansion has been evaluated in a Draft Environmental Impact Statement (U.S. Army Corps of Engineers, Los Angeles District, 1996), which was released as a public document in January, 1997.

Negotiations with DOI and DOD resulted in agreement to expand the NTC & Fort Irwin by an additional 110,111 acres; 46,438 acres to the east, and 63,673 acres to the west in superior Valley. The agreement will allow the NTC to regain access for training of 22,139 acres south of the UTM 90 gridline that had been set aside for desert tortoise. President Clinton signed the agreement on 21 December 2000. The agreement was an order to start the expansion process, not the actual withdrawal of the land. Land withdrawal will occur in separate legislation, probably in 2002.

Current operations and potential for future expansion are also constrained by the existing features at the NTC & Fort Irwin (see Figure 2.2). These features include NTC's cantonment area, where housing and operations facilities are located, the Tiefert and Granite Mountains, the Air Force's Leach Lake impact area, the Goldstone Deep Space Communications Center, and Fort Irwin Road (Chambers Group, Inc., 1991).

2.3 Installation History

In 1940 President Roosevelt withdrew lands for War Department use to establish an anti-aircraft firing range by Executive Order 8507. The Mojave Anti-Aircraft Range (Camp MAAR) was activated on August 8, 1940, and soldiers first occupied the post during June 1941. On November 4, 1942 the reservation was renamed Camp Irwin after Major General George Leroy Irwin, Commander of the 57th Field Artillery Brigade during World War I. During World War II the armored division of General George S. Patton's Third Army was trained at the installation. The post was put on surplus status on September 8, 1947, and the property was transferred to the War Assets Administration on October 13, 1948.

Camp Irwin was reactivated on July 16, 1951 for the Korean Conflict and was under the command of the Sixth Army, headquartered at the Presidio in San Francisco, California. Camp Irwin was redesignated as the Fort Irwin Armor and Desert Training Center on August 1, 1961, and the status of the installation was upgraded to a permanent Class I installation. Fort Irwin was again closed in January 1971 and placed into caretaker status under the jurisdiction of the California Army National Guard. In August 1979 Fort Irwin was selected as the site for the Army's National Training Center. The U.S. Army resumed operation of Fort Irwin in January 1981. The first NTC training exercise took place April 13, 1981, but major force-on-force exercises did not begin until January 17, 1982.

The NTC & Fort Irwin has been used for anti-aircraft, armored, and mechanized training for both regular Army and/or California Army National Guard units since 1940. The NTC & Fort Irwin provides the critical edge in training brigade-level units in highly realistic combat situations. This facility is unique in the world and played a major role in the development of tactics and training of troops in the AirLand battle tactics used successfully in Operation Desert Storm.

2.4 Satellite Installations

Due to the lack of adequate hanger space for maintenance, the NTC & Fort Irwin has leased a portion of the Barstow-Daggett Airport for military operations of its helicopter maintenance facility. Barstow-Daggett is located east of Barstow, about 35 miles from the installation.

Figure 2.1: Location of the National Training Center and Fort Irwin, California

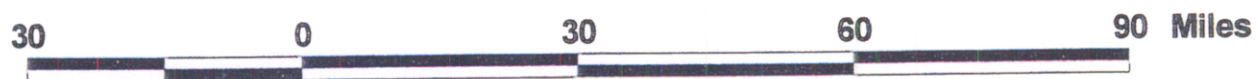
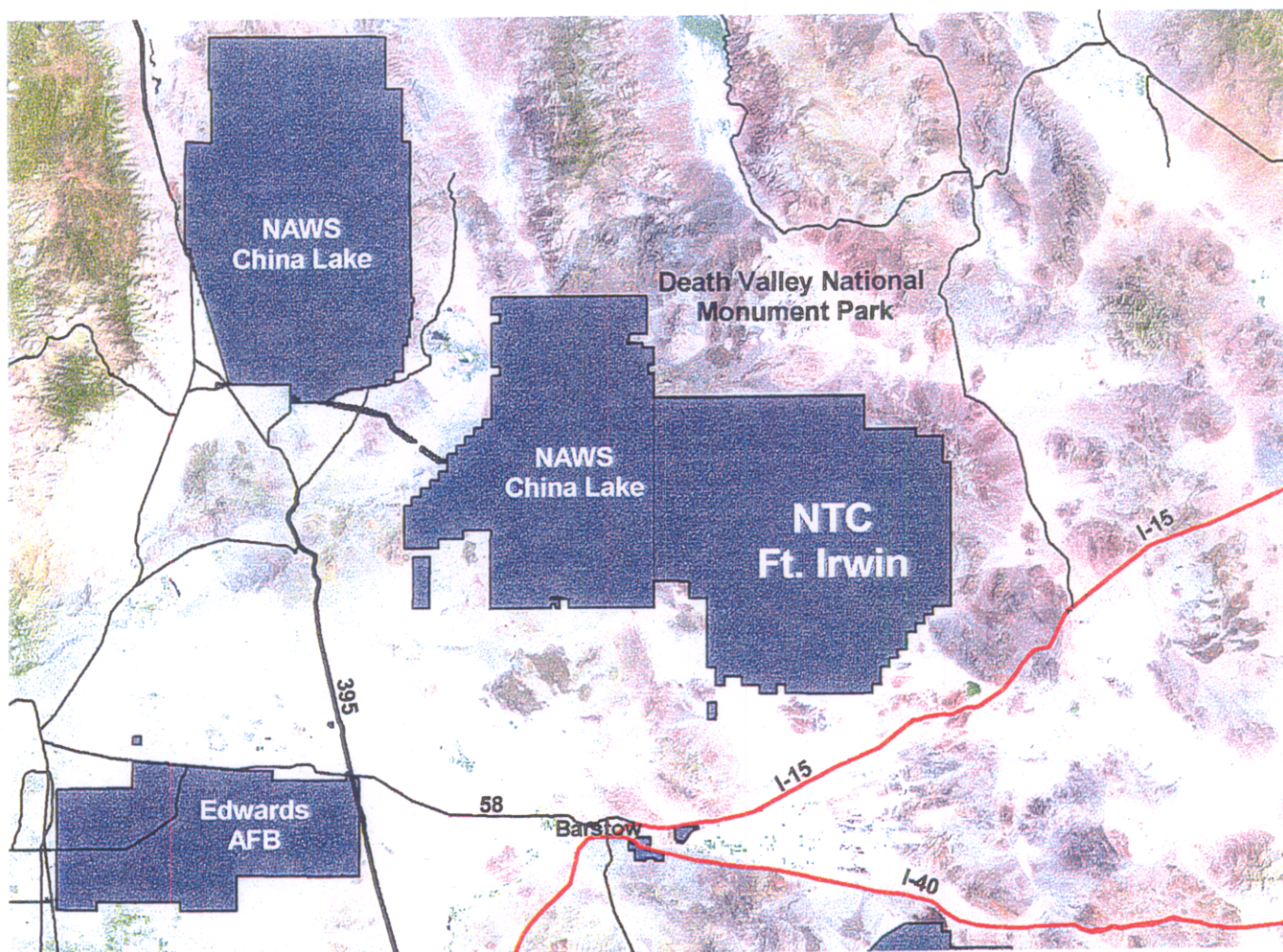
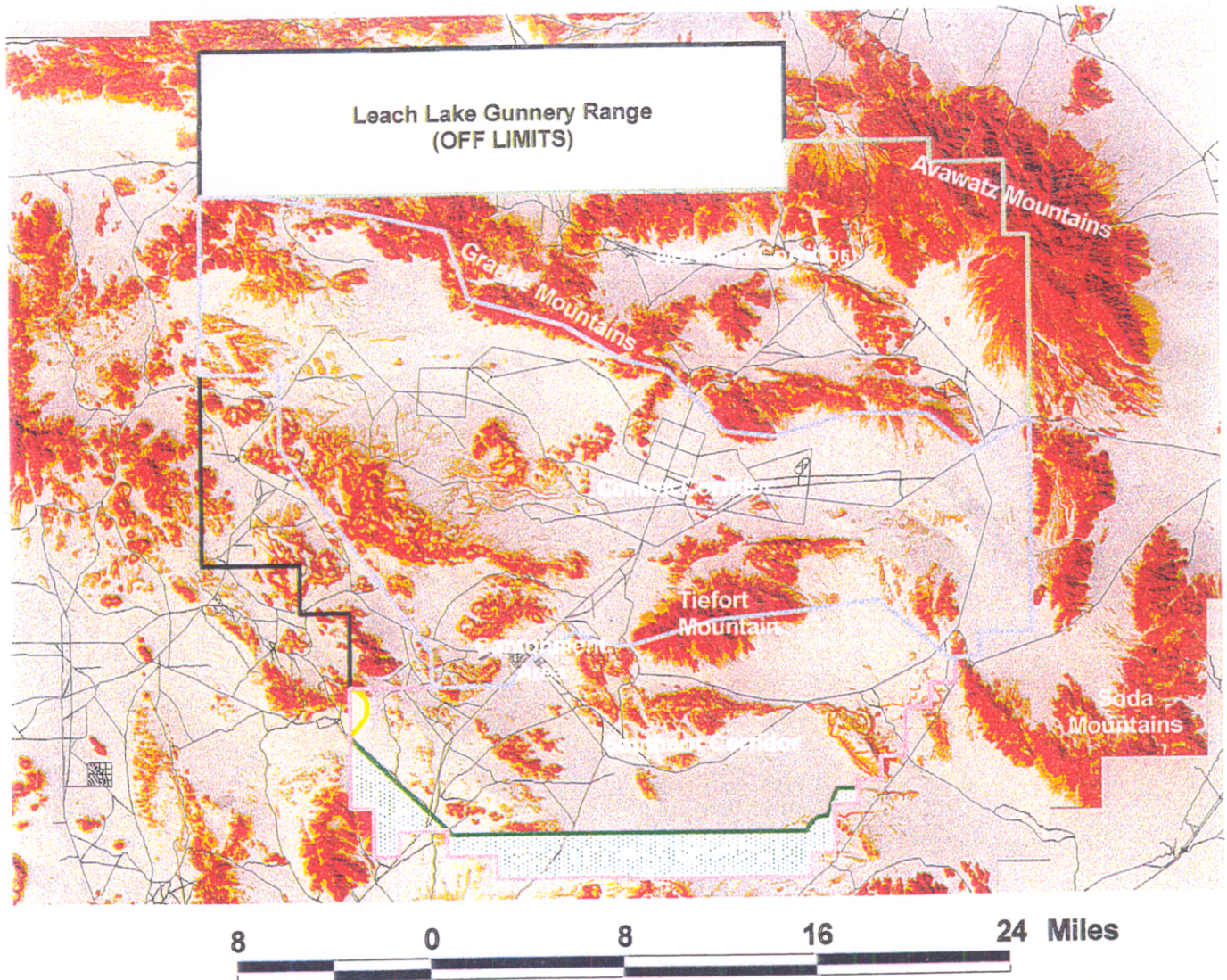






Figure 2.2: Major Features of the National Training Center and Fort Irwin



-  Roads and Trails
-  Lane Mountain Milk Vetch Area
-  Desert Tortoise Habitat
-  Goldstone Complex
-  Central Corridor
-  Northern Corridor
-  Southern Corridor
-  Goldstone Complex
-  Leach Lake Gunnery Range



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The NTC and Fort Irwin has also leased a portion of Southern California International Airport (former George Air Force Base) to use as a troop landing facility. Rotational troops are flown to George Air Force Base and then bussed an hour and fifteen minutes to the Training Center. Prior to using George Air Force Base, troops landed in Las Vegas, which was a three-hour bus ride.

The NTC & Fort Irwin also includes two sections of land to the northeast of Coyote Lake, which is about two miles south of the southwestern corner of the installation. This land was purchased as a potential future water withdrawal site for the installation, but there are no plans to use this water in the near future.

3. MILITARY MISSION

"Success in the information age will go to those who have the courage to challenge themselves, who constantly innovate, and learn to adapt as they go."

General Gordon R. Sullivan, former Army Chief of Staff

"Soldiers will survive during war in the 21st Century due to the state-of-the-art training received at the National Training Center."

Wayne Johnson, ITAM Program Manager, NTC & Fort Irwin

3.1 Overview

The mission of the NTC & Fort Irwin is to provide tough, realistic combined arms training in accordance with current doctrine in a mid- to high-intensity environment. The NTC & Fort Irwin is organized and equipped to support battalion task force level training. The conditions that prevail closely approach those of actual combat. The climate and terrain are harsh and severe to intensify the stress and fatigue for soldiers and equipment. Exercises at the NTC & Fort Irwin expose soldiers, many for the first time, to a level of stress unequaled outside of actual combat. As a result, the NTC & Fort Irwin gives unit leaders and their soldiers an opportunity to train as they will fight, make mistakes, learn from them, survive, and win. This uniqueness of the NTC & Fort Irwin is a critical component of its mission. The instrumented battlefield provides continuous and real-time feedback and heightens learning at all levels. The NTC & Fort Irwin also serves as a laboratory and data source for training, doctrine, organization, and equipment. The NTC & Fort Irwin is the premier war-fighting academy in the nation and is acclaimed around the world.

3.1.1 Mission of NTC & Fort Irwin

In 'Count On Us' The U.S. Army: 'The World's Premier Force' (Association of the U.S. Army, 1996) Army Chief of Staff General Dennis J. Reimer underscores the importance of training in today's Army:

In the future, the Army will inevitably be asked to place soldiers in harm's way with little or no notice. We will then expect them to defeat a determined and dangerous foe. When the deployment orders are issued, we must be satisfied that we have done our best to prepare them for the task at hand. Our watchwords continue to be that we will send no soldier into harm's way who is not trained for the mission.

Ten rotations, each consisting of two or three (armor/infantry) battalions and support units (approximately 4,500 soldiers), come to the NTC & Fort Irwin annually for intensive combat training against an opposing force. During their 23-day stay at the training center, rotational units experience 14 days of combat training, including both force-on-force and live-fire training. Units are equipped with the Multiple Integrated Laser Engagement System (MILES). MILES uses eye-safe laser "bullets" to simulate the lethality and realism of the modern tactical battlefield. The system is highly valued for its ability to accurately assess battle outcomes and teach soldiers the skills required to survive in combat. The California Army National Guard often trains on weekends between scheduled NTC & Fort Irwin training rotations.

The training mission at the NTC & Fort Irwin consists of intensive simulated war scenarios between opposing and friendly forces. The NTC's 11th Armored Cavalry Regiment is thoroughly trained in threat tactics and doctrine. The NTC cavalry regiment consists of two maneuver battalions. The primary arsenal of an armor battalion is the M1 main battle tank, and for a mechanized infantry battalion it is the M2 Bradley fighting vehicle. NTC units are known as the OPFOR (Opposing Force), and the two battalions are combined and organized as a Motorized Rifle Regiment. The OPFOR operates at a strength of approximately 2,364 soldiers, 265 tracked vehicle (tanks and Armored Personnel Carriers), and 635 wheeled vehicles. OPFOR tracked vehicles and support equipment are visually modified with fiberglass panels to represent threat forces (appear similar to actual enemy equipment).

The OPFOR's opponent is the friendly force, or BLUEFOR. The combined strength of a rotational unit is approximately 4,500 soldiers using 500 tracked vehicles and 1,000 wheeled vehicles. Most vehicles used by the BLUEFOR are maintained and stocked at the NTC & Fort Irwin, but some additional vehicles are brought in from the rotational unit's home station during each rotation.

Another group involved in the NTC's training mission are Observer Controllers (OCs), who come from the NTC Operations Group stationed at the NTC. The OCs function as coaches and mentors for various battle scenarios and provide educational comment and instruction to ensure attainment of the NTC & Fort Irwin mission. They are in the field with the BLUEFOR to observe, analyze, and counsel units on their performance throughout the planning, preparation, and execution of all missions. The OCs also assess "casualties" from simulated battlefield scenarios and weapon systems not represented by the MILES system. The size of this group is approximately 640 personnel, 42 tracked vehicles, and 460 wheeled vehicles.

The realism of the force-on-force battle scenarios is dependent on the MILES system. In these simulated battles, eye-safe laser beams replace bullets, missiles, and artillery projectiles. All weapons on the battlefield are equipped with a small device that emits a pulse of light energy when activated by a blank but noisy round. All tactical vehicles and soldiers are equipped with multiple sensors to detect laser hits. Laser hits on a specific target are distinguished as a near-miss, a cripple hit, or a kill. Laser signals are coded to replicate the destructive power and range of the weapon doing the firing. In other words, a rifle or machine gun laser cannot kill a tank; a TOW or tank cannon coded laser is necessary. However, a sniper with a rifle can kill a tank commander if his head is exposed. A killed target is out of the battle, and weapons are programmed not to function after a kill. The OCs possess "keys" to reactivate killed targets.

As realistic and effective as the MILES system is for simulating combat with tanks, armored personnel carriers, missiles, and infantry, in some cases it cannot realistically address other potent battlefield weapons, such as minefields, artillery, mortars, aircraft strikes, anti-aircraft guns, and chemical weapons. This is where the judgment and assessments of the OCs are critical. The OCs carry a pistol-sized master controller gun capable of "killing" any vehicle or soldier.

All spatial and temporal battlefield information generated by the MILES system and enhanced by additional detailed data from remote video cameras and OC observation is sent to, analyzed, interpreted, and displayed through computers on video monitors located in the Core Instrumentation Systems Building in the cantonment area. This complete analysis of force-on-force exercises under near-combat conditions is the important facet and unique experience of the NTC. The complete analysis is provided to the visiting unit as a take-home package to enhance future training at their home station. No other Army on earth can achieve such a level of experience and battle drill proficiency without suffering casualties.

The other important component of a rotational unit's training events is live-fire exercises. Most live-fire training takes place in an extensive network of automated targets in the northern part of the NTC. Machine guns, rifles, and the cannons of tanks and armored personnel carriers use live ammunition. Hellfire missiles, 2.75-inch rockets, and TOWs are fired, but other missile and rocket systems retain their MILES eye-safe laser capabilities because of the cost of these projectiles. Firing units must cross minefields and negotiate concertina wire and other obstacles as they engage the enemy. Sequential pop-up targets simulate progressive movement by the enemy, including alternating frontal and flank views to simulate movements around obstacles or responses to terrain contours.

Another live-fire complex is the much smaller Multi-Purpose Range Complex located on Goldstone Road just east of the Goldstone Deep Space Communication Complex, which contains Ranges 1 through 8A. This range complex is used for small arms fire (rifle, pistol, and shotgun), both light and heavy machine guns (7.62 mm and 0.50 cal), grenade launchers, tank main gun, and Bradley 25 mm main gun, mortars, antitank missiles, and hand grenades. Most large projectiles are not explosive but are inert (training) or high velocity sabot rounds.

3.1.2 Post Population and Major Troop Units

Active duty military personnel assigned to the NTC & Fort Irwin include 3,852 soldiers supported by 584 Department of the Army, 232 non-appropriated fund, and 1,563 other (primarily contractors) civilian workers.⁷ There are approximately 5,000 military dependents. About 30,000 troops annually train during monthly rotations at the post. The 11th Armored Cavalry Regiment is stationed at the NTC & Fort Irwin. This unit provides soldiers for the OPFOR.

3.2 Relationships Between Natural Resources and the Military Mission

*The conservation of natural resources and the military mission will not be mutually exclusive.*⁸

Commanders need to train in the kind of environment that they can expect to see in combat. In order to do that, the training environment must be maintained in as natural condition as possible.

Fort Irwin comprises approximately 1,004 square miles in the Mojave Desert and, as such, has typical flora and fauna of a desert ecosystem. This area is characterized by mountainous terrain with steep slopes and deep dissected alluvial fans. There are several large valleys which are used for tank maneuvers with mountains, hills, and valleys adding additional "concealment points" for ambushes. The flora of the Mojave Desert consists mainly of Creosote Scrub, characterized by short (usually less than five feet tall) sparse vegetation.

⁷ Memorandum For: The Business Press, ATTN: Judy Muse, *Number of Employees on Fort Irwin*, Public Affairs Officer, 15 May 1998.

⁸ AR 200-3, *Natural Resources - Land, Forest and Wildlife Management*, para 2-11.

The Mojave Desert ecosystem is fragile at best. The area typically receives approximately three to four inches of rain a year. Soils develop very slowly in the harsh conditions of desert environments and may not be replaced for centuries following disturbance (Phillips, Brandt, and Reddick, Inc., 1981). Desert soils are extremely vulnerable to disruption, and once disturbed, can be easily eroded by wind and water. Desert soils are also highly vulnerable to compaction. For this reason, it is NTC & Fort Irwin policy for tanks and other military equipment to remain on tank trails and roads except when engaged in a battle. Roads and tank trails, which are necessary for rapid deployment of equipment and personnel, are subject to flash floods, especially in the unusual intense summer rainstorms.

3.2.1 Compatibility Issues

The purpose of this section is to identify potential conflicts and incompatibility between the conservation efforts of the natural resources and their uses and the military mission. Potential conflicts may be spatial, temporal, or residual/indirect in nature. Spatial conflicts may occur when areas within the NTC & Fort Irwin contain natural resources that limit military use, when military activity disrupts a critical natural resource, or when more than one natural resource occurs within an area resulting in different management objectives. Temporal conflicts may occur when two parties intend to use an area at the same time or when planned uses are not optimized with respect to biological issues (e.g., activity periods of protected species). Residual/indirect conflicts may occur when incidental noise, pollution, and fugitive dust, for example, have an effect on natural resources or their planned use.

Because military training is the cardinal use of the NTC & Fort Irwin natural resources, efforts are made to minimize these conflicts. Occasionally, conflicting military goals and conservation mandates preclude military activities at specific locations. This INRMP and other management plans address these conflicts. The following methods have been developed to avoid and minimize potential and existing conflicts.

Vegetative Resources

Nine vegetation communities have been identified on the NTC & Fort Irwin (Section 6.6.1). The extent of these associations varies dramatically, based on elevation, water availability, topography, soil content, and other abiotic factors. Each vegetation association supports a diverse assemblage of wildlife; some wildlife species are specific to a vegetation type, whereas others are distributed throughout the Training Center and occur in all vegetation types.

Potential conflicts with the acceptable stewardship of military lands will be minimized through active management and inherent limiting effects of the terrain. Gunnery ranges (which probably have increased fires due to invasive annual plants) and impact zones are generally off-limits; springs and other areas of high biological diversity are fenced; and measures to protect populations of endangered species have been developed. Most force-on-force training maneuvers are confined by the natural topography; slopes greater than 20 percent are not used extensively, and mountainous terrain is largely avoided. Fort Irwin's creosote community receives the highest degree of impact from military maneuvers.

Desert Tortoise and Other Listed Species

The Federal Endangered Species Act of 1973, as amended, requires lands under the jurisdiction of the DoD (in this case the Army) to conserve listed species. As defined in the Act, conservation is the use of all

species are specific to a vegetation type, whereas others are distributed throughout the Training Center and occur in all vegetation types.

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The Federal Endangered Species Act of 1973, as amended, requires lands under the jurisdiction of the DoD (in this case the Army) to conserve listed species. As defined in the Act, conservation is the use of all methods and procedures necessary to bring any listed species to the point where protections provided by the Act are no longer necessary. Section 7 of the Act requires the Army to formally consult and confer with the USFWS if any action by the Army may affect a listed species or critical habitat. Pursuant to these requirements and the presence of the federally-listed desert tortoise (*Gopherus agassizii*) on the NTC & Fort Irwin, the Army has engaged in formal consultation with the USFWS to develop measures to avoid and minimize impacts to the desert tortoise.

The Biological Opinion issued by the USFWS (1995), superseding the 1991 Biological Opinion (USFWS, 1991), to the Army identifies the Terms and Conditions under which the Army may operate on the NTC & Fort Irwin while remaining in compliance with the Act. As such, potential conflicts between desert tortoise conservation and NTC & Fort Irwin military use of training lands have been addressed to the satisfaction of both parties. In addition, a Programmatic Management Plan for desert tortoise sub-populations on the NTC & Fort Irwin has been developed (Chambers Group, Inc., 1996a). This programmatic plan lists a series of management recommendations (based on the reasonable and prudent measures outlined in Biological Opinion) identifying steps to ensure the desert tortoise's survival on the NTC.

An endangered species management plan addressing potential conflicts and recommendations for management of the desert tortoise and other sensitive wildlife and botanical resources is being developed to address conflicts between these sensitive resources and the military mission on the NTC & Fort Irwin (Chambers Group, Inc., 1998). This plan includes projects for the southwestern willow flycatcher and least Bell's vireo, which likely only use the NTC & Fort Irwin during migration, and the recently listed Lane Mountain Milkvetch. It also includes projects for the State-listed Mohave ground squirrel, alkali mariposa lily, and the Mohave monkey flower as well as projects that will generally benefit other avian species and bats.

Cultural Resources

An Integrated Cultural Resources Management Plan (SAIC, 1998) was developed to address conflicts between the numerous cultural resources, both identified and as yet undiscovered, within the NTC & Fort

Irwin and the military mission. Chapter 13 discusses the protection of cultural resources as related to implementation of this INRMP.

Outdoor Recreation

Outdoor recreation opportunities are available to support the NTC & Fort Irwin community quality of life, consistent with available natural resources and compatibility with the military mission. Chapter 12 describes outdoor recreation programs on the NTC & Fort Irwin. The following methods to avoid and minimize potential conflicts between outdoor recreation and the military mission have been developed:

When ***Desert Explorers Club*** activities are planned on base, the following regulations are to be followed:

- Military operations take priority over any planned activities.
- If trips are planned within the military operation area, arrangements must be made with Range Control prior to commencement of the activity.
- If a trip is planned for a down-range area, children are permitted only when accompanied by a parent or legal guardian after attending a range safety briefing.

As with all private organizations and unofficial activities on the installation, activities are permitted at the discretion of the Installation Commander. The organization must also follow the policy guidance for private organizations as listed in NTC Pamphlet 210-1.

Hunting must be accomplished in accordance with NTC Regulation 420-3, which includes the following to preclude interference with the military mission:

- Ranges open to hunting are designated by Range Control.
- Hunter access control is the responsibility of Range Control.

An ***Off-Highway Vehicle (OHV)*** area, north of the intersection of Barstow Rd. and NASA Rd, is currently under review. The area will be open for use any time during official posted hours. OHV users will be required to check in with Range Control before and after activities. In addition, users must comply with all sign postings and off-limits boundaries.

Although the ***High Desert Equestrian Club*** is not recognized as an official outdoor recreation activity, potential safety problems may exist with equestrian-related recreational activities. If all horseback riding activities are restricted to the area designated by Range Control, no conflicts are expected to occur between equestrian and military training activities. However, there are still safety concerns for horseback riders and other outdoor recreation enthusiasts. No comprehensive plan exists for the proper coordination of recreational activities. Additionally, no safety procedures are in place for any equestrian or other outdoor recreation activity in case of accidents resulting in serious injury.

3.2.2 Effects of the Military Mission on Natural Resources

Due to the limited rainfall, plants of the Mojave Desert grow very slowly. A large creosote bush about five

feet tall with a five-foot wide spread may be over 50 years old. Removal of this type of vegetation for camouflage or driving over it during battles would leave a void in that area which would not be replaced for many decades.

Driving a tank across previously undisturbed desert leaves a mark which remains for decades and destroys desert crusts. The NTC & Fort Irwin is home to the federally-threatened desert tortoise. This slow moving reptile is vulnerable not only to crushing by vehicles, but also to habitat reduction. Repeated military exercises have reduced the habitat of the desert tortoise significantly in the most heavily trained areas.

Lane Mountain Milkvetch is a rare and very narrow endemic of the central Mojave Desert. The NTC & Fort Irwin's Lane Mountain Milkvetch population is limited to approximately 150 plants. The area where this herb occurs is currently off-limits due to desert tortoise critical habitat and as such military activity poses no threat to habitat reduction. The majority of the milkvetch habitat is located in the superior valley. Fort Irwin conducted a milkvetch survey in the spring of FY99, and found over 800 additional milkvetch plants. In the spring of 2001, milkvetch survey teams found an additional 3,000 plants in and around the proposed expansion area within the Superior Valley. Our intention is to find adequate habitat to mitigate for the plants lost in the expansion of the NTC & Fort Irwin.

Other flora and fauna have been affected by training on the installation. For example, exotic weed species are increasing in highly disturbed areas, and these weeds directly and indirectly compete with native plant species and the wildlife dependent upon native plants. The NTC & Fort Irwin ITAM program has developed a list of 12 indicator species, both plants and animals, which can be used to predict when an area has been affected by training to the extent that it requires rehabilitation.

Mountainous areas of the installation are less affected by training than are the areas with less than 20 percent slope. Areas above 20 percent slope are not conducive to good military training and are relatively undisturbed, with exception that some vehicles use slopes up to 50 percent, which often creates trails. These steep areas tend to harbor displaced species from more heavily used training areas.

Many impacts of the military mission on natural resources occurred prior to implementation of the ITAM program at the Training Center. ITAM is beginning the task of rehabilitating damaged sites and making recommendations about the manner in which training is conducted with regard to minimizing damage. However, the backlog of damaged areas is extensive.

3.2.3 Effects of Natural Resources or Their Management on the Military Mission

The NTC & Fort Irwin command and staff are determined to complete the military training mission successfully, and an integral part of that mission is good environmental stewardship. After evaluating populations of the desert tortoise and its habitat, the NTC & Fort Irwin placed about 25,000 acres of prime training land south of the UTM grid line 90.0 (along the southern boundary) off-limits because it is good desert tortoise habitat. This area was later declared critical habitat for the desert tortoise.

When a soldier encounters a desert tortoise, he/she is instructed to stop activities and call the Environmental Division for guidance in dealing with the animal. If the animal is in danger and activities

allow the biologist to go to the site, the biologist will process the animal (weigh, measure, number, and take pictures) and move it from harms way. If circumstances will not permit the biologist to visit the site, the soldier (or unit) is instructed on how to move the animal.

There are permanent and intermittent springs on the installation. Water is vital to any desert ecosystem, and as such, the springs have been placed off-limits to all training. The NTC & Fort Irwin educates field personnel about the off-limits nature of spring locations as part of major briefings prior to each military exercise to avoid impacts by military equipment and personnel on natural and cultural resources associated with spring areas. The NTC & Fort Irwin erects fencing and metal crossbars at portions of these springs likely to be approached by wheeled and tracked vehicles to reduce accidental intrusion into and subsequent damage to these resources.

Playas (except Red Pass Lake and Langford Lake) are off-limits and avoided by military personnel because of potential impacts to associated biological and cultural resources, and dust problems associated with their use. Additionally, due to the playas' potential to generate finely divided particulate matter (PM 10), they are avoided during military maneuvers. This material can cause health and safety hazards as well as precipitate fines and notices of violation under the Clean Air Act.

3.3 Future Military Mission Impacts on Natural Resources

Current maneuver space is inadequate primarily due to modern tactics and doctrine. The modern U.S. war fighting doctrine, known as Joint Operations, is influenced by foreign forces and potential adversaries. The static front lines of World War II and Korea have given way to the fluid 100-mile-deep rear, main, and forward battle areas of the Persian Gulf. From training at the NTC and experiences in Operation Desert Storm, it is obvious that a successful modern Army must be very mobile and train on far more land than its predecessors.

3.3.1 Acquisition of Additional Land

There is a significant shortfall in the amount of trainable land at NTC & Fort Irwin, particularly considering rapidly evolving weaponry and battlefield tactics (Land Use Requirements Study, Appendix A, U.S. Army Corps of Engineers, Los Angeles District, 1996). The Army has proposed the acquisition of additional training land for the NTC & Fort Irwin (U.S. Army Corps of Engineers, Los Angeles District, 1996), as discussed in Section 2.2. This action is outside the scope of this INRMP. If additional land is acquired during 2001-2005, this INRMP will be amended to include specific natural resources management programs for newly acquired lands.

3.3.2 Unit Changes

There are no projected significant unit changes for the permanent party at the NTC & Fort Irwin. However, inherent to the installation's mission, visiting training units will continue to come from military installations throughout the Army, including its allies. In recent years Reserve Component units have played an increasingly important role in America's military strategy. Thus, Reserve Component units are and will continue to use the NTC & Fort Irwin on a more intensive basis than in the Training Center's early years.

3.3.3 Training Scenario Changes

The Training Center is in the process of making substantial changes to training scenarios to better prepare soldiers for changing world conditions and threats. This process, to one degree or another, will always be ongoing. Such changes in training scenarios can significantly change the impacts of training on the environment.

4.0 FACILITIES

The NTC & Fort Irwin consists of the cantonment area, training ranges, down range support facilities, and desert training areas. Downrange training facilities consist of a live-fire area, live fire target ranges, pop-up target ranges, and force-on-force training areas, where MILES-equipped personnel and vehicles engage in bloodless battles. Chapter 7 further describes these areas.

4.1 Transportation System

A rail system is used to bring equipment to the railhead at Yermo, CA, northeast of Barstow, where it is off-loaded and driven up the Manix Trail to the NTC, a journey of approximately 27 miles (43 km). Remaining equipment and supplies are trucked to the installation by commercial trucking companies, traveling 35 miles (56 km) to Fort Irwin from Interstate 15 just east of Barstow on Fort Irwin Road, a two lane, black-top road.

The Army provides a subsidized bus system for military and civilians to reduce traffic on Fort Irwin Road. Buses run Monday through Friday in the early morning and evening from Victorville and Barstow, where ridership averages about 400 people a day. There are several car pools for the rest of the 2,500 civilian work force and military personnel who do not live on the installation.

4.2 Water

The NTC & Fort Irwin consumes an average of 2.5 million gallons (9.5 million liters) of water per day (mgd). About 60,000 gallons (227,400 liters) per day of this demand are used outside the cantonment area for field activities involving troop maneuvers. Based on the *Water Basin Development Plan* (Wilson F. So & Associates, 1989), projections of daily demand will increase to 3.75, 4.11, and 4.36 mgd by the years 2000, 2020, and 2040, respectively.

The *Water Basin Development Plan* (Wilson F. So & Associates, 1989) was prepared to analyze water uses and project future uses that would not deplete the available resources. It was estimated that approximately 1,550 acre-feet of rainfall recharge groundwater basins per year. Based on this recharge rate, different scenarios for water use were analyzed. The Plan recommends a 35-year groundwater development scenario of 1,300 acre-feet for Bicycle Basin, 1,500 acre-feet for Langford Basin, and 1,500 acre-feet for Irwin Basin. These usage rates would extend the production longevity of the basins into the future while meeting estimated future base demands. More accelerated production rates could degrade aquifer sedimentary characteristics and raise pumping costs for diminishing groundwater resources in local basins.

The NTC & Fort Irwin has finalized a Water Master Plan to aid in planning for future water demand at the installation and provide recommendations for meeting projected water supply needs of the permanent and transient base population. The approved water supply project involves development of three new production wells in Langford Basin to meet anticipated future water demands. The U.S. Geologic Survey recently initiated a comprehensive groundwater study for the NTC & Fort Irwin that will provide additional

information on the quantity and quality of groundwater in the basins used by the installation.

If necessary, Coyote Basin could be developed as an additional groundwater resource. Coyote Basin is believed to contain substantial groundwater resources, and basin recharge may be significantly supplemented by water leaking across the Manix Fault from the Newberry. Long-term overdrafting (*i.e.*, groundwater withdrawals that greatly exceed recharge rates) from adjacent basins may adversely affect the future rate of Coyote Basin recharge and hence reduce the estimated production life of the aquifer. Although the NTC & Fort Irwin has withdrawn two public land sections overlying Coyote Basin groundwater resources for water production purposes, it currently does not draw from Coyote Basin and is not likely to initiate immediate use of this basin. The need for future water development may be delayed by water conservation measures that reduce demand within the cantonment area and extend the production life of Bicycle, Langford, and Irwin aquifers.

Water supplies for the installation are high in fluoride. The base has a reverse osmosis treatment system to reduce fluoride levels in drinking water.

4.3 Wastewater System

The NTC & Fort Irwin operates and services a wastewater treatment facility within the cantonment area. The facility was originally permitted in 1981 (Board Order 6-81-49, now Board Order No. 6-93-42A1) and has a 2.0-mgd plant design capacity. It is permitted by the California Regional Water Quality Control Board as a zero discharge system; therefore, no discharge to surface watercourses occurs.

The base wastewater treatment facility services both the cantonment area and portable field latrines. Portable field latrines are serviced regularly, and their contents are returned to the plant for processing during off-peak hours. The base sewage facility was designed to support a daily population of 10,000. The original system consisted of a collection system that conveyed the wastewater to two primary clarifiers, a heated anaerobic sludge digester, and a grease pit. Wastewater solids were conveyed to a sludge drying area, and the liquid effluent was discharged to oxidation ponds for evaporation and sometimes used as emergency fire water. In 1995 a new wastewater treatment plant was constructed. The old oxidation ponds have been put on stand-by. Prior to the modifications, reeds, rushes, and other aquatic and semi-aquatic vegetation suitable for wildlife habitat were translocated to a nearby standing effluent pond to provide continuous habitat for resident avian species.

The NTC Sewage Treatment Plant is a secondary treatment facility. The system consists of a primary treatment system, which screens out major debris, and a secondary system where water is treated through an extended aeration system, secondary clarification and chlorine contact tanks. The secondarily treated water is then pumped and sent through sprinklers over a 40-acre site. This water percolates through the soil.

A tertiary treatment plant could greatly reduce the TDS in the groundwater, but it would require major expense in refitting the infrastructure to use the water for irrigation only. It would also require a large amount of acreage to handle the 2.0 million gallons of water per day of effluent that the system produces. Possible uses for the water would be a golf course, a water resource for vegetated wind breaks along tank trails, and watering athletic fields and lawns. A feasibility study to install a tertiary treatment system and

reclaim the water for irrigation of cantonment area green fields is underway.

4.4 Storm Water Drainage System

Storm water is an important facet of environmental management at the NTC & Fort Irwin as significant rainfall events can generate enough storm water to inundate the Sewage Treatment Plant. The installation has developed a storm water management plan (Radian Corporation, 1995). Implementation of this plan is the responsibility of the DPW Compliance Section and is not a natural resources function at the installation.

4.5 Projected Changes in Facilities

The NTC & Fort Irwin will continue modernization of facilities during the next five years, but the only significant new "footprint" was the construction of a Live Fire facility three miles east of Drinkwater Lake. This 7,000 square-foot facility is a two-story building. The NEPA process has been used to minimize impacts on natural resources.

Projected changes to the cantonment area include the construction of a third party hotel to accommodate visitors, contractors, and temporary duty billets. The hotel will have 180 rooms, which are projected to be at 80% capacity most of the time. There are also additional 200 military housing units to be developed, completely within the cantonment area. Other new/modernized facilities changes include a 300-person barracks, 557th Maintenance facility, MATES facility, hazardous waste facility, Fire Department building, 300-person Child Development Center, Education Center, live-fire bunker, and rotational wash facility. There are also preliminary plans for major upgrades to Range 1. The NEPA process has been or will be used to minimize negative environmental effects of these proposed projects.

In FY 99-00 a heliport was constructed at Barstow-Daggett Airport to replace leased facilities. The project included an 85,000 square-foot hanger and a 7,000 square-foot administrative building, both were constructed on existing footprints. There are other projects planned to modernize this facility. The NEPA documentation and tortoise surveys associated with this project have been completed.

5.0 RESPONSIBLE AND INTERESTED PARTIES

5.1 National Training Center and Fort Irwin

5.1.1 Commanding General

The Commanding General commands the NTC & Fort Irwin and implements policies and directives of the Department of the Army and the U.S. Army Forces Command (FORSCOM). The Commanding General bears ultimate responsibility for management of natural resources on the NTC & Fort Irwin, including its land and wildlife. The Commanding General's support infers support by all other commands on the installation. Acting through the Command Group, personal and special staff, directors, and separate commanders, the Commanding General is responsible for (Department of the Army, 1995):

- providing for funding and staffing of natural resource management professionals and other resources required to effectively manage natural resources on the installation;
- planning land utilization to avoid or minimize adverse effects on environmental quality and provide for sustained accomplishment of the mission;
- entering into appropriate cooperative plans (16 USC 670a) with State and Federal conservation agencies for the conservation and development of fish and wildlife, soil, outdoor recreation, and other resources;
- ensuring the functioning of an Installation Environmental Quality Control Committee (which is personally chaired by the Commanding General and meets monthly);
- ensuring ongoing and timely coordination of current and planned land uses between mission, natural resources, environmental, legal, and master planning;
- inspecting and reviewing mitigation measures that have been implemented or recommended for the protection of natural resources as prescribed in environmental documentation in accordance with AR 200-2;
- ensuring all installation land users are aware of and comply with procedures and requirements necessary to accomplish objectives of this INRMP together with laws, regulations, and other measures designed to comply with environmental quality objectives; and
- appointing a natural resources management professional as the Installation Natural Resources Coordinator.

5.1.2 Garrison Commander

The Garrison Commander serves as the principal assistant to the Commanding General for the management of Fort Irwin. The Garrison Commander directs and is responsible for all aspects of garrison operations at Fort Irwin, including natural resources management. As such, the Garrison Commander is responsible for most of the implementation of this INRMP.

5.1.3 Directorate of Public Works

The Director of Public Works (DPW) will maintain an organization with resources needed to accomplish the INRMP and, acting through the Chief of the Environmental Division, is responsible for (Department of the Army, 1995):

- developing and implementing programs to ensure the inventory, delineation, classification, and management of all applicable natural resources to include: wetlands, scenic areas, threatened and endangered species, sensitive and critical habitats, and other natural resource areas of special interest;
- providing for the training of natural resources personnel;
- implementing this INRMP;
- reviewing all environmental documents (e.g. environmental impact assessments and statements and remedial action plans) and construction designs and proposals to ensure adequate protection of natural resources, ensuring that technical guidance as presented in this INRMP is adequately considered;
- coordinating with local, state, and federal governmental and civilian conservation organizations relative to natural resources management for the NTC & Fort Irwin;
- managing all phases of the natural resources program for the NTC & Fort Irwin with appropriate natural resources management personnel; and
- administering all aspects of the installation pest control program.

The *Natural and Cultural Resources Manager* carries out DPW responsibilities for the integrated management of natural resources on the NTC & Fort Irwin addressed in this INRMP, including desert ecosystem management and implementation of NEPA.

More specific responsibilities of the Natural and Cultural Resources Section include:

- general enhancement of wildlife habitat;
- ensuring compliance with state and federal laws and regulations involving natural and cultural resources;
- using natural resources management to support the military mission;
- protecting land investments from depreciation by adopting land use practices based upon soil capabilities;
- administering the hunting program;
- implementing general wildlife management and research;
- maintaining and implementing the INRMP;
- maintaining a trained, professional staff;
- ensuring enforcement of federal, state, and installation laws and regulations pertaining to natural and cultural resources;
- cooperating with state and federal natural and cultural resources agencies;
- implementing the Integrated Cultural Resources Management Plan;
- protecting and, whenever possible, enhancing wetlands;
- minimizing erosion;
- maintaining the Integrated Pest Management Plan and serving as the NTC & Fort Irwin Pest Management Coordinator; and
- protecting threatened and endangered species by:
 - species inventorying and monitoring,
 - habitat protection and enhancement,
 - ecological research initiatives,
 - recovery planning and implementation,
 - regional coordination, and
 - conserving populations of threatened and endangered plants and their habitats, and
 - implementing the Endangered Species Management Plan.

The **Mojave Desert Ecosystem Program (MDEP)**, a multi-agency program, is housed in Barstow. The MDEP was envisioned as a tool to enable informed decision-making for sustainable land management across an ecoregion that includes over 80,000 square miles. The Department of Defense Legacy Resource Management Program in cooperation with the Department of Interior fostered the program. The MDEP currently focuses on identifying data and building a comprehensive scientific database for the Mojave Desert. As such, the MDEP geographic information system (GIS) is available to the NTC & Fort Irwin ITAM GIS spatial database and supports implementation of this INRMP. Conversely, the NTC & Fort Irwin adds to the overall MDEP database as the post makes available its scientific understanding of this complex ecosystem.

The **Compliance Program Manager** is not responsible for implementing this INRMP. However, some programs within the Compliance Section directly or indirectly affect natural resources management on NTC & Fort Irwin, including:

- drinking water and sewage treatment,
- surface and storm water protection,
- air quality management,
- the solid waste and recycling program, and
- pollution prevention measures.

5.1.4 Deputy Commander, Chief of Staff

The Deputy Commander, Chief of Staff, acting through the G3-Training, is the principal assistant to the Commanding General for planning, estimating, coordinating, integrating, and supervising: military training, short and long-range mission and mobilization planning, troop movements, aviation operations, range operations, nuclear biological and chemical plans, operations and training, operational security, intelligence, counterintelligence and security activities, emergency operations, special events and ceremonies, and force modernization and integration activities.

The **G3** provides access to ranges to accomplish provisions of this plan, assists in enforcing considerations within range regulations and is directly responsible for implementation and/or support of portions of this INRMP which directly affect or interact with training responsibilities including:

- operating and maintaining NTC & Fort Irwin ranges, associated training facilities, field training sites, and range equipment;
- preparing, maintaining, and enforcing the Range Regulation;
- providing ITAM program management and funding for the NTC & Fort Irwin;
- providing input to FORSCOM for ITAM program users requirements;
- managing the GIS database to ensure support for all installation programs that rely on GIS data layers; and
- coordinating with DPW on training activities that may affect wildlife, the desert ecosystem, wetlands, or cultural resources.

The **ITAM Program Manager** is responsible for implementation of the ITAM program, as broadly described in Section 1.7 and as individual components in Chapters 8, 9, 11, and 16.

The Military Personnel Adjutant General, under the DCCS, will act to determine that effective natural

resource management is an identifiable function and is specifically accountable in the performance evaluation at each command level, in accordance with DoD Directive 4700.4, 25 Jan 89, Section E.3.c.

5.1.5 Directorate of Community Activities

The Director of Community Activities (DCA) establishes procedures and governs installation outdoor recreation activities, except hunting (AR 215-1). Programs that particularly affect the NTC & Fort Irwin natural resources include equestrian programs, off-road cycling, and golf. Responsibilities include:

- planning and implementing the installation Outdoor Recreation Program (AR 215-2);
- supervising and maintaining outdoor recreation activities, exclusive of hunting; and
- collecting fees and charges for various outdoor recreation activities.

5.1.6 Public Affairs Office

The Public Affairs Office is responsible for promoting an understanding of the NTC & Fort Irwin among its various publics and providing professional public affairs advice and support to installation leaders and activities. The Public Affairs Office is an important component of the natural resources program for the NTC & Fort Irwin, especially in disseminating information critical to the success of the program.

5.1.7 Staff Judge Advocate

The Staff Judge Advocate provides legal advice and counsel and services to Command, Staff, and subordinate elements of the NTC & Fort Irwin. Specific Staff Judge Advocate responsibilities with regard to integrated natural resource management include:

- conducting legal research and preparing legal opinions pertaining to interpretation and application of laws, regulations, statutes, and other directives;
- coordinating with the Department of Justice, Litigation Division of the Office of the Judge Advocate General, and other Governmental agencies on matters pertaining to litigation for the Federal Government;
- advising the DPW on compliance with NEPA, especially with regard to management of endangered species on the NTC & Fort Irwin; and
- advising the G3 on laws and regulations that affect training land use, management, and compliance.

5.1.8 Inspector General

The installation Inspector General will determine whether the provisions of DoD Instruction 4715.3 are being adequately accomplished on the NTC & Fort Irwin in accordance with this Plan and appropriate Army regulations.

5.1.9 Other Installation Organizations

Implementation of this Plan will require assistance from other directorates and organizations. Such organizations include the Directorate of Contracting (procurement), Provost Marshal (law enforcement), commanders of major subordinate organizations, and commanders of tenant units and activities.

5.2 Other Defense Organizations

5.2.1 U.S. Army Forces Command

The U.S. Army Forces Command (FORSCOM), located at Fort McPherson, Georgia, is responsible for providing command and technical supervision of the NTC & Fort Irwin's natural resources program by (Department of the Army, 1995):

- assisting with program implementation and conducting staff visits to NTC & Fort Irwin,
- reviewing outdoor recreation plans for compatibility with the Installation Master Plan and natural resources management plans and programs,
- ensuring that effective natural resources stewardship is an identifiable and accountable function of management, and
- reviewing and approving this INRMP as the Final Approving Authority.

FORSCOM will conduct an onsite evaluation of this natural resources program at least once every three years and will act as trustee over the overall natural resources program.

5.2.2 Army Environmental Center

The Army Environmental Center, located at Aberdeen Proving Ground, Maryland, provides oversight, centralized management, and execution of Army environmental programs and projects. It has support capabilities in the areas of NEPA, endangered species, cultural resources, ITAM, environmental compliance, and related areas.

5.2.3 U.S. Army Corps of Engineers

5.2.3.1 Los Angeles District

The U.S. Army Corps of Engineers, Los Angeles, California assists the NTC & Fort Irwin by administering contracts for outside or other agency support and administering wetland permits in accordance with Section 404 of the Clean Water Act. These contracts include those involved with sensitive species surveys and others.

5.2.3.2 Norfolk District

The U.S. Army Corps of Engineers, Norfolk, Virginia has assisted NTC & Fort Irwin with contractor personnel to function within the cultural resources program and the MDEP and assists with contracting for certain projects, such as this INRMP.

5.2.3.3 Sacramento District

The U.S. Army Corps of Engineers, Sacramento, California has assisted the NTC & Fort Irwin with contracts for various surveys and support for the MDEP.

5.2.4 U.S. Army Environmental Awareness Resource Center

The Environmental Awareness Resource Center provides material for the Environmental Awareness program within ITAM. The NTC & Fort Irwin have extensively used this support, and this service is likely to continue to be used during 1999-2003.

5.2.5 Other Military Installations

The NTC & Fort Irwin coordinates and cooperates with other military installations within the Mojave Desert on numerous programs, including the MDEP. Installations often involved with the NTC & Fort Irwin in these efforts include Edwards Air Force Base, Marine Corps Air Ground Combat Center at Twenty-nine Palms, Marine Corps Logistics Base at Barstow, and Naval Air Weapons Station at China Lake. These five Department of Defense installations have formed a team (Planning and Coordination of Interagency Desert Environmental Resource Managers [PACIDERM]) which meets quarterly to coordinate and discuss land use issues of mutual interest. The MDEP DoD Coordinator is the Executive Secretary of PACIDERM, and the Natural and Cultural Resources Manager at the NTC & Fort Irwin is the Training Center representative. These installations have many mutual interests, particularly involving ecosystem management of the Mojave Desert, as evidenced by regional initiatives identified in Section 1.6.

5.3 Other Federal Agencies

5.3.1 U.S. Department of Interior

5.3.1.1 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS), Region 1, has a field station at Ventura, California which provides technical advice and regulatory guidance for management of natural resources on the NTC & Fort Irwin, particularly endangered and threatened species. Department of Army Regulation 200-3, Chapter 11, provides guidance to be followed by the NTC & Fort Irwin when dealing with the USFWS for endangered species management. The USFWS is a partner in the MDEP and other regional initiatives and cooperative ventures with Training Center.

The USFWS is a signatory cooperator in implementation of this INRMP in accordance with the Sikes Act. Appendix 5.3.1.1 contains specific items of agreement among the USFWS, California Department of Fish and Game, and the NTC & Fort Irwin, as required by the Sikes Act.

5.3.1.2 U.S. Geological Survey

The U.S. Geological Survey, via the Biological Resources Division, has supported the NTC & Fort Irwin for raven management, desert tortoise surveys, and similar projects. The U.S. Geological Survey is a partner in the MDEP and other regional initiatives and cooperative ventures with the NTC & Fort Irwin.

5.3.1.3 National Park Service

The National Park Service manages Death Valley National Park, whose southern boundary is about one mile north of the northern boundary of the NTC & Fort Irwin. Death Valley National Park is a partner in the MDEP and other regional initiatives and cooperative ventures with the Training Center. The NTC & Fort

Irwin has used two facilities at Joshua Tree National Park for the propagation of grasses and shrubs for the LRAM component of the ITAM program.

5.3.1.4 Bureau of Land Management

The BLM has responsibility for vegetation management of all withdrawn lands at the NTC & Fort Irwin. However, management authority has been handed to the NTC & Fort Irwin through a memorandum of understanding (MOU). The Army accomplishes much of the on-the-ground management of these resources, but BLM retains oversight roles. In 1996 BLM removed tamarisk from Bitter Springs as a reimbursable project. The BLM is a partner in the MDEP and other regional initiatives and cooperative ventures with the NTC & Fort Irwin.

5.3.2 U.S. Department of Agriculture, Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) conducted soils surveys on 95% of the NTC & Fort Irwin. In FY 96 the NRCS assisted the installation with a subjective evaluation of options for dust control. The NRCS is a partner in the MDEP and other regional initiatives and cooperative ventures with the NTC & Fort Irwin.

5.3.3 National Aeronautics and Space Administration (NASA)

The NASA Goldstone Deep Space Communication Complex and satellite tracking facility uses 33,000 acres on the western edge of the NTC & Fort Irwin. Goldstone has its own environmental program, including endangered species management. However, the Army has ultimate responsibility for natural resources management on Goldstone. Goldstone and the NTC & Fort Irwin environmental personnel have close working relationships.

Goldstone has very limited use for military activities and thus serves as a control for comparison purposes with other portions of the NTC & Fort Irwin. This has been particularly useful for evaluating effects of military activities on the desert tortoise. The NTC & Fort Irwin ITAM program has Land Condition Trend Analysis sites on Goldstone to facilitate this control-treatment arrangement.

5.4 State Agencies

5.4.1 California Department of Fish and Game

The California Department of Fish and Game (CDFG) is responsible for management of most fish and wildlife within the State, including those on federal lands. The CDFG maintains a California Natural Diversity Database (CNDDB) which is useful for management of natural resources at the NTC & Fort Irwin. The CDFG is particularly interested in monitoring a herd of bighorn sheep that move through the northeastern portion of the installation, and they have an interest in chukar management since the bird is a major game species in the Mojave Desert. The agency also is responsible for maintaining a list of State-sensitive species, some of which are found on the NTC & Fort Irwin.

The CDFG is a signatory cooperator in implementation of this INRMP. Appendix 5.3.1.1 contains specific items of agreement among the CDFG, USFWS, and the NTC & Fort Irwin, as required by the Sikes Act.

5.5 Universities

Regional universities have provided specialized expertise to help manage natural resources on the NTC & Fort Irwin. California State University Dominguez Hills and Colorado State University have conducted most of the recent LCTA monitoring at the Training Center. The University of California Los Angeles Botany Department conducted Lane Mountain Milkvetch and other plant surveys on the installation as well as plant research. The University of California Riverside has conducted insect surveys, and San Diego State University has supported the ITAM program. John Carroll University, Ohio is being used to evaluate relationships between cryptogamic crusts and revegetation. The Desert Research Institute, University of Nevada, Reno is studying soil hydrology on the installation. The NTC & Fort Irwin will continue to use university expertise to assist with its natural resources programs during 1999-2003.

5.6 Contractors

The NTC & Fort Irwin uses contractors for many programs associated with natural and cultural resources, including plan preparation, large cultural resources surveys, and dust control. Contractors are heavily used to provide on-site personnel to help implement natural and cultural resources programs, including ITAM, cultural resources management, and natural resources management. The use of contract personnel is anticipated to increase during 2001-2005.

5.7 Other Interested Parties

General public interest in natural resources management at the NTC & Fort Irwin is high, in part due to ongoing land expansion activities. There were over 1,000 written responses to the draft EIS (U.S. Army Corps of Engineers, Los Angeles District, 1996). However, no particular environmental group has expressed a long-term sensitivity to actions occurring at the installation.

6.0 NATURAL RESOURCES AND CLIMATE

6.1 Topography

The NTC & Fort Irwin is located in the Mojave Desert physiographic province. In this area high mountain peaks and ridges are separated by broad alluvial fans and wide, flat valleys. Large basins without external drainage develop playas (very flat, dry lakebeds). The average elevation of the Mojave Desert is approximately 2,500 feet (762 m) above mean sea level (msl). Individual peaks of isolated mountain areas on the Training Center reach elevations of up to 6,400 feet (1,951 m) above msl.

6.2 Geology

Rock formations at the NTC & Fort Irwin span a vast period of geologic time from the Precambrian (over 600 million years ago) to the Holocene (11,000 years ago to present). A thick sequence of sandstone, shale, and limestone was deposited during the Precambrian period and subjected to regional metamorphism and igneous intrusion during the late Precambrian and early Paleozoic periods. The region received thick marine sediments, including massive limestone deposits, from inland seas that inundated the region during the Paleozoic through the Triassic period. Before the end of the Mesozoic era, seas withdrew from the region, and large tectonic movements caused sediments to be folded, faulted, and intruded.

In the early Tertiary period the region was subjected to renewed deformation as the area was uplifted. This period was marked by extensive and deep erosion and creation of localized basins. A variety of sediment/rock types was produced, with some providing extensive fill in the ever-deepening basins. Events of the Quaternary period formed the topography seen today, and the Pleistocene experienced renewed movement along major faults, including upwarps of land masses with attendant folding and faulting.

A complex assemblage of consolidated rock types in the region forms mountains and hills and underlies alluviated valleys at depth. The Avawatz Mountains consist of a complex assemblage of pre-Tertiary granitic and metamorphic rocks, Paleozoic sediments, Triassic metasedimentary and metavolcanic rocks, Tertiary sediments, and Tertiary volcanic rocks. The intersection of the Garlock and Death Valley fault zones along the northeastern flanks of the Avawatz Mountains is generally responsible for this stratigraphic complexity. Salt and gypsum deposits occur along this fault zone in the Avawatz Mountains.

A heterogeneous assemblage of igneous, metaigneous, and metasedimentary rocks spanning a long period of pre-Tertiary geologic time forms the basement complex (bedrock) in the Alvord Mountains. Tertiary volcanic rocks and associated continental sedimentary sequences, including rocks of the Upper Barstow Formation, overlie the basement complex. Continental sediments are primarily composed of arkosic sandstone and conglomerate interbedded with this sequence of silt, clay, and tuff. Volcanic rocks consist of basalt flows that are interbedded with continental sedimentary rocks.

Within the NTC & Fort Irwin area along the Garlock Fault zone, the Quail Mountains are made up of undifferentiated Mesozoic granitic and metamorphic rocks. North of the fault zone, the Quail Mountains primarily consist of Tertiary volcanics. Unconsolidated deposits within the installation include alluvium, aeolian (dune) sand, and playa deposits. Alluvium consists of unconsolidated deposits of clay, silt, sand, and gravel. In some areas the alluvial material is highly sorted, resulting in clean sands and gravels that are prolific water-bearing units. Other poorly sorted alluvial deposits contain large amounts of fine-grained

material, including silts and clays. Alluvium increases in thickness from edges of basins to their central floors.

Alluvial deposits are generally heterogeneous, with coarse sands and gravels occurring in stringers and lenses, intercalated with finer grained sediments. The heterogeneity of the alluvium has important hydrologic implications and can result in localized artesian conditions as clays and silt lenses confine the layers of coarse-grained water-bearing sediments. Alluvial valley fill forms the most important water-bearing unit in the study area.

Several dry lakes (or playas) occur within the NTC & Fort Irwin. Playa deposits accumulated from material in shallow bodies of water that covered lower portions of closed valleys during floods. The thickness of deposits underlying many of these dry lakes is unknown; however, playa deposits of the Mojave Desert range from a few feet to as much as 100 feet thick. Topographic, seismic, and gravitational data layers on the natural resources GIS database are available at various scales to facilitate land management decision-making.

6.2.1 Seismicity

Principal faults bounding the Mojave Desert are the San Andreas Fault to the southwest and the Garlock Fault to the northwest. The internal wedge between these faults defines the Mojave Desert and is generally referred to as the "Mojave block."

The eastern part of the NTC is near the intersection of the Death Valley and Garlock fault zones. One major branch of the Garlock fault zone roughly coincides with the north-to-northeast face of the Avawatz Mountains. The Garlock Fault is one of the major east-west trending faults in southern California. The Garlock Fault has historically exhibited seismicity along its western extension where it displaces Holocene age alluvium. It is a strike-slip fault with left-lateral displacement and separates the Basin and Range Province from the Mojave Desert Province. Along the eastern portion of the fault, only minor seismicity has been observed.

The Death Valley Fault is a right-lateral, strike-slip fault and extends along the northeastern Avawatz Mountains and eastern Soda Mountains. Segments of the Death Valley Fault have exhibited evidence of Holocene movement.

The Mule Spring Fault extends the length of the northern Avawatz Mountains and separates Tertiary and Quaternary sedimentary strata from the diorite basement. Shutter ridges, perched stream gravels, and other surficial tectonic expressions indicate very recent activity along the Mule Spring Fault.

The historically active Manix Fault roughly parallels Interstate 15 slightly south of the NTC & Fort Irwin. Other Quaternary faults in the area include an unnamed fault between East Cronese Lake and Red Pass Lake, numerous northwest-trending faults in the Soda Mountains, and a fault along the northwest flanks of the Silurian Hills (Jennings, 1992).

Like most of southern California, the NTC & Fort Irwin has experienced moderate seismicity in the recent past. A general increase in the amount of seismic activity has been documented in the Mojave Desert region following the 7.5 (surface wave magnitude) "Landers" earthquake and 6.5 "Big Bear" earthquake of June 28, 1992. Two historic epicenters were in the Silurian Hills, the larger of which had a Richter magnitude of at least 4.5 (Dames and Moore, 1991). In addition, epicenters of several earthquakes of magnitude 3.0 to 4.4 have been located in the Avawatz Mountains. Maximum credible earthquakes along either the Garlock or

Death Valley fault zone in the Training Center area could result in ground acceleration in excess of 0.3 g (Dames and Moore, 1991).

6.2.2 Petroleum and Minerals

Although minerals exist on the NTC & Fort Irwin, no mining or exploration is carried out due to the exclusion signed by President Roosevelt in the 1940s. The installation has known gold reserves and potentially has silver. There are no known petroleum reserves. Geothermal resources are not hot enough to have commercial value (M. Quillman, personal communication).

6.3 Soils

The NTC & Fort Irwin is in the Mojave Desert portion of the Basin and Range Province, which is dominated by broad alluvial basins stretching between mountain ranges. Eroded mountain tops of outcropping bedrock rise above alluvial fans and valleys filled with sediment.

Detailed soil surveys have been conducted by the NRCS, formerly known as the Soil Conservation Service (SCS), on approximately 95 percent of the Training Center. These data have been digitized and made available on the GIS database for land use decision-making. Other soils information consists of data sets from the NRCS State Soils Geographic database at a 1:500,000 scale and partial coverages on selected regions made by summarizing more detailed soil maps. Where detailed soil maps are not available, soils information is derived from assembled geology, topography, vegetation, and climate data, as well as satellite imagery. Soils of the NTC & Fort Irwin are shown at Figure 6.3.

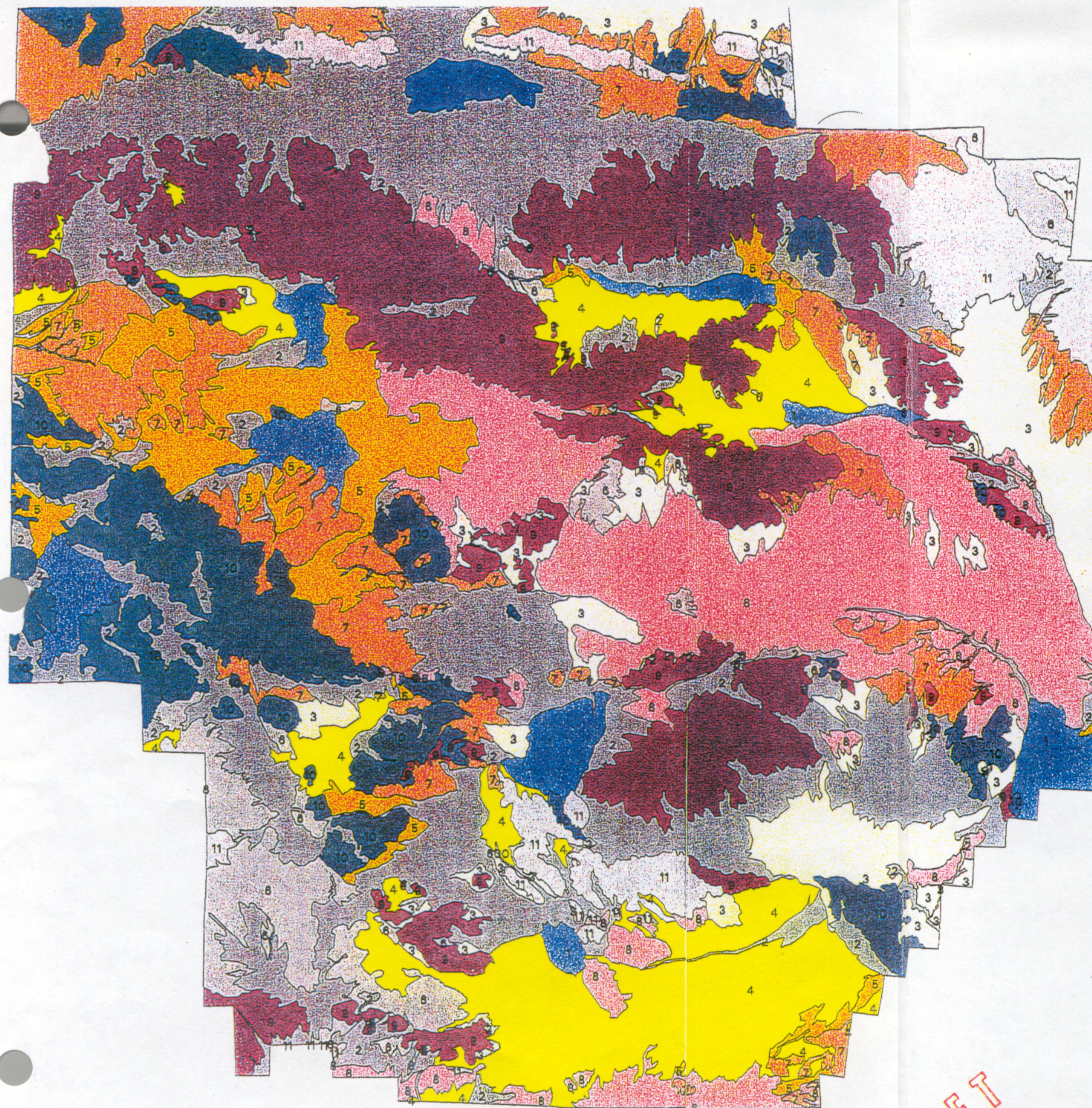
Soils develop very slowly in the harsh conditions of desert environments and may not be replaced for centuries following disturbance (Phillips, Brant, and Reddick, Inc., 1981). Desert soils are extremely fragile and vulnerable to disruption, which results in wind and water erosion. Soil may be transported away from disturbed areas, leaving them void of soil or soil-forming materials. Desert soils are also highly vulnerable to compaction.

Hardened soil crusts form on clay or silty desert soils by the biological activity of resident bacteria, algae, and lichens. Cryptogamic crusts stabilize surface integrity and resist wind and water erosion from both drops and water flows. These crusts "fix" atmospheric nitrogen in low quantities, making it available to desert flora. Vehicles disturb cryptogamic crusts, making them vulnerable to soil erosion by wind and water. The time required for these soils to develop and their recovery rates are unknown. ITAM contractors are investigating the use of inoculating soils to promote the formation of cryptogamic crusts.

Patches of "desert pavement" are found at the Training Center and throughout the greater Mojave Desert. Desert pavement may include many different soil associations; however, it is usually characterized by a surface crust of pebbles and rocks, often rendered dark and shiny, that protects fragile desert soils from further erosion. Once removed, this crust requires several thousands of years to reform.

The coarsest depositional materials derived from mountainous parent rock are generally found on upper regions of high plains; the finest materials are along valley floors. Soils of upper bajadas (or coalescent alluvial fans along bases of mountain ranges) consist of coarse gravels grading into loamy gravels toward the toe of alluvial fans. Soils of lower bajadas grade from sandy loams to finer loamy materials. Playas located at the bottom of basins accumulate silts and clays and generally develop salt pans.

Figure 6.3: Soils, National Training Center and Fort Irwin, California



GENERAL SOIL MAP

FORT IRWIN MILITARY RESERVATION

NEARLY LEVEL TO GENTLY SLOPING SOILS IN BASINS AND ON BASIN RIMS

1 Nasagold-Typic Aquisalide-Arizo

GENTLY SLOPING TO MODERATELY STEEP SOILS ON ALLUVIAL FANS AND ALLUVIAL FAN REMNANTS

2 Arizo-Yermo-Granitepass

3 Arizo-Twobitter-Carizzo

4 Golddivide-Cajon-Gravesumit

5 Crackerjack-Fortirwin-Blackmagic

UNDULATING TO STEEP SOILS ON GRANITIC PEDIMENTS AND INSELBERGS

6 Paintrocks-Rock Outcrop

UNDULATING TO STEEP SOILS ON FAN REMNANTS EROSION REMNANTS BALLENAS

7 Crackerjack-Crosgrain-Dime

8 Dime-Cronose-Hollyhills

ROLLING TO VERY STEEP SOILS ON HILLS AND MOUNTAINS

9 Dalvord-Etinarg-Rock Outcrop

10 Haleburu-Rock Outcrop

11 Mulespring-Juratrias-Langwell

DRAFT

Higher mountains of the NTC & Fort Irwin are excessively drained, very stony or rocky, sandy loams to sands that are derived from nearby parent material. These soils develop on strongly sloping to very steep upland slopes of 9 to 75 percent. Rock outcrops cover 30 to 90 percent of the ground surface area. Where present, soil depth is seldom more than 10 inches (25.4 cm).

Desert soils that develop on the alluvial fill at the Training Center are generally light in color, deficient in phosphorus and nitrogen, and lacking in organic matter. Except on river terraces and a few other older alluvial landforms, soils have little profile development.

6.4 Water Resources

6.4.1 Surface Water

Surface water resources within the NTC & Fort Irwin and its vicinity are scarce. No perennial watercourses dominate this region. Washes descending from mountains and other elevated landforms provide intermittent channels that route surface runoff downgrade into topographical depressions (playas) where temporary or ephemeral lakes are formed. This water accumulation occurs during times of greater than average precipitation and can be expected to occur at least once each decade.

During heavy runoff events, water in washes carries sand, gravel, cobbles, and even boulder-sized rocks as part of the bedload transport. Deposition of this bedload material across areas of less steep terrain has resulted in the formation of alluvial fans commonly observed in this area. Significant subsurface flows may occur in the unconsolidated sand and gravel channel deposits found in washes and alluvial fans, even after surface flows have ceased. Local groundwater recharge may occur along washes because of this subsurface water movement. Without a drainage outlet, surface water in shallow ephemeral lakes is lost through groundwater percolation or evaporation.

The only naturally occurring permanent surface water resources on the NTC & Fort Irwin are six springs and one watershed that produce meager to small quantities of water. Several types of intermittent surface water resources are present on post. Four intermittent springs produce little to no water during summer, depending on the seasonal amount of rainfall. All streams are intermittent, and all naturally occurring standing water is ephemeral, occurring only during and immediately after heavy rains or thunderstorms.

When surface flow due to high intensity rainfalls occurs, the water soon percolates into the sandy soil of dry washes and/or collects on any of the 10 playas at the NTC & Fort Irwin. The playas range in size from 340 acres (136 hectares) to 1,297 acres (519 hectares). Standing water on playas, a result of low infiltration rates in evaporated clay lakebeds, is a short-lived phenomenon. Evaporation of playa waters results in precipitation of alkali salts at or near the surface of the playa.

Jack Spring (NK 220898) is located approximately 100 yards (91 m) south of the NTC's southern border. It is important to the area's ecosystem functionality, including adjacent areas on the Training Center.

Springs

| Permanent Springs | Map Coordinates |
|----------------------|-----------------|
| Bitter Spring | NK 518982 |
| Cave Spring | NK 516329 |
| Devouge Spring | NK 382256 |
| Garlic Spring | NK 327984 |
| Leach Spring | NK 152342 |
| Two Springs | NK 330335 |
| Hellwind Canyon | NK 181338 |
| Intermittent Springs | Map Coordinates |
| Arrastre Spring | NK 545350 |
| Desert King Spring | NK 260312 |
| Drinkwater Spring | NK 366247 |
| No Name Spring | NK 377228 |

6.4.2 Groundwater

Few water wells have been drilled at the NTC & Fort Irwin, but the U.S. Geological Survey has mapped the Irwin Basin Aquifer and some of the Bicycle Lake Aquifer. Historically, groundwater was withdrawn from wells at Denning Spring in the Avawatz Mountains, Riggs Mine in the southwest Silurian Hills, and the southeast end of Silurian Dry Lake (Mendenhall, 1909). Bicycle, Irwin, and Langford basins are used to supply current water needs of the NTC & Fort Irwin. The Army has purchased two sections of land for water rights in Coyote Basin. This land could be developed as a groundwater resource for the NTC, if required.

These four basins are all bow-shaped aquifers filled with water-bearing unconsolidated deposits. Three producing wells have been drilled in Bicycle Basin, three in Langford Basin, and five in Irwin Basin to meet the NTC's current water needs (U.S. Army, National Training Center and Fort Irwin, 1988). Depth to groundwater in each of these basins is between 200 and 500 feet (60-152 m). Section 4.2 further describes sources of water at the NTC & Fort Irwin.

Total dissolved solids (TDS) are a growing concern of the Training Center. The quantity of total dissolved solids in irrigation water is not remarkable, but the TDS in the soil are being leached through the soil to the water table, where the NTC & Fort Irwin draws its water. The level of TDS is elevated in the water table near the 40-acre (16-hectare) leaching area. A plume of TDS approaching 700 ppm (1,000 ppm is the legal limit) is spreading through the Training Center water table (Quillman, personal communication, 1996).

6.5 Climate

Hot summers, mild winters, infrequent rainfall, moderate afternoon winds, and generally fair weather characterize the climate of the NTC & Fort Irwin. The Training Center has installed a network of 14 remote sensing weather stations to better monitor weather conditions over the entire installation where localized weather changes are often dramatic. Data are collected every 15 minutes and tabulated and stored on a GIS. Weather conditions can be portrayed on the GIS and used to help evaluate effects of military actions on the resource base.

6.5.1 Precipitation

Rainfall at the NTC & Fort Irwin varies considerably in both time and space. Rainfall averages 3.9 inches (7.4 cm) per year. Relative humidity is typical of the high southeastern Mojave Desert area and is low in the summer (except during infrequent rain storms). Mean monthly relative humidity ranges from a high of 54 percent in January to a low of 22 percent in June (MBA, Inc., 1991).

6.5.2 Temperature

Monthly mean temperatures at the installation, as determined from long-range climatic data at the Barstow/Daggett Airport and Bicycle Lake Army Air Field within the NTC & Fort Irwin, range from 48 to 89° Fahrenheit (F) (9 to 32° Celsius (C)) with a maximum mean of 104°F (40°C) and a minimum mean of 36°F (2°C).

6.5.3 Winds

Regional winds are primarily influenced by the Sierra Nevada and Transverse mountain ranges, the distance inland from coastal northwest winds, and inland winds that flow out across the high desert plains from the Los Angeles Basin. Regional winds are typically from the southwest with a yearly average speed of about 10 miles (16 km) per hour. The U.S. Army Corps of Engineers, Los Angeles District (1996) includes a wind rose as Figure 3.8-1.

Winds blowing across State Highway 127, east of the boundary of the NTC & Fort Irwin, show a dominant airflow to the east. Dust generated by Training Center maneuvers normally parallels Interstate 15 and passes north of Baker. During winter, strong turbulent winds sometimes occur, often accompanying frontal systems, and can reach speeds of 25 to 60 mph (40 to 96 km/h). Dust storms often accompany these strong winds.

6.6 Flora

The Mojave Desert is divided into five floristic regions (Rowlands *et al.*, 1982). The NTC & Fort Irwin is located in the Central Region, near its border with the Southwestern and South-Central regions. The Central Region is expected to have the fewest species because it is the smallest of the five regions and has only a few mountain peaks. About 500 species of plants have been identified on the installation. The Avawatz Mountains in the northeastern corner of the NTC & Fort Irwin are the only peaks above 5,248 feet (1,600 m), rising to 6,117 feet (1,865 m). Topographic relief in the form of mountains and incised bajadas increases structural and microclimatic characteristics of an area and therefore increases floral diversity.

6.6.1 Vegetation Communities

Vegetation communities on the NTC & Fort Irwin were categorized based on the qualitative scheme developed by Holland (1986). The following discussions of vegetation communities rely heavily on recent reports by Gibson *et al.* (1994) and Chambers Group, Inc. (1994).

Mojave Creosote Bush Scrub

Creosote bush scrub is the most common vegetation type in the region, dominating about 70 percent of the Mojave Desert (Holland, 1986). Likewise, creosote bush scrub is the most widespread community of the

NTC & Fort Irwin, occurring throughout the range below 3,600 feet (1,100 m) on alluvial slopes, valley floors, and mountain slopes (Gibson *et al.*, 1994). A sub-association of this vegetation type is described as the creosote-burrobush association based on the widespread dominants creosote bush (*Larrea tridentata*) and burrobush (*Ambrosia dumosa*). Burrobush is a much smaller shrub that may often be numerically more abundant than creosote bush, but projected foliar cover and volume is generally, but not always, dominated by creosote bush. Griffith (1993) found burrobush to be more abundant than creosote bush on the NTC & Fort Irwin, occurring on 99.5 percent of the plots surveyed (compared to 47.9 percent for creosote bush). In localized sites creosote bush may represent the only woody species; however, it is conspicuously absent around playas because of high salinity (Wallace and Romney, 1972) and/or dense fine-textured basin soils low in oxygen (Lunt *et al.*, 1973). Creosote bush and burrobush size and vigor are strongly influenced by water availability, and the largest individuals are characteristically found along edges of washes and roads. Many subdominant shrubs occur in creosote bush scrub, including range rhatany (*Krameria erecta*), silver cholla (*Opuntia echinocarpa*), Anderson's boxthorn (*Lycium andersonii*) desert straw (*Stephanomeria pauciflora*), wishbone bush (*Mirabilis bigelovii*), and cheesebush (*Hymenoclea salsola*). At higher elevations subdominants include California buckwheat (*Erigonum fasciculatum*), hopsage (*Grayia spinosa*), winter fat (*Krashennikovia lanata*), and bladdersage (*Salazaria mexicana*).

Blackbrush Scrub

Creosote bush scrub is replaced by blackbrush scrub (*Colegyne ramosissima*) above elevations of 3,600 to 5,900 feet (1,100 to 1,800 m). Blackbrush scrub occurs on upper alluvial fans and mountain slopes. It often occurs as monotypic stands; however, on the NTC & Fort Irwin it co-occurs with a number of shrubs, including turpentine bush (*Thamnosma montana*), Mormon tea (*Ephedra nevadensis*), goldenbush (*Ericameria linerifolia*), hopsage, and needle grass (*Achnatherum speciosum*). Scattered junipers (*Juniperus californica*) occur as a canopy for blackbrush scrub and are discussed separately below. Blackbrush scrub occurs on slopes above Drinkwater Springs in the Granite Mountains and in higher elevations of the Avawatz Mountains in the vicinity of Cave Springs.

Mojave Mixed Woody Scrub

Mojave mixed woody scrub is a heterogeneous assemblage of shrubs that grows in steep, rocky, granitic, or volcanic slopes. The lack of a dominant shrub species makes it difficult to clearly categorize this scrub type into the more common communities. Mixed woody scrub at the NTC & Fort Irwin consists of some of the most interesting perennial flora. Species include many cacti, Spanish bayonet (*Yucca schidigera*), and species of *Brickellia*, *Ericameria*, *Ephedra*, and *Encelia*. Examples of this scrub type on granitic soils occur in southern passes in Leach Lake Gunnery Range and steep slopes of the Avawatz and Granite mountains.

Mojave Desert Wash Scrub

Mojave desert wash scrub is a low, shrubby, diverse community occurring in open washes, arroyos, and canyons throughout the desert. Periodic flooding in these areas maintains the open character of this community. Representative shrubs include spiny sena (*Senna armata*), rayless encelia (*Encelia frutescens*), cheesebush, desert almond (*Prunus fasciculata*), indigo bush (*Psoralea aborescens*), and sandpaper plant (*Petalonyx thurberi*). In some areas this community may have scattered small tree species.

Saltbush Scrub

Saltbush scrub is characterized by the dominance of one or more species of saltbush. Saltbush scrub is

associated with moderately alkaline soils toxic enough to inhibit most desert shrubs that occur in the creosote bush scrub. It commonly occurs on lower bajada slopes and plains and around playas throughout most of the desert (Holland, 1986). Good examples of saltbush scrub can be found on playas along margins of dry lakes on the NTC & Fort Irwin. Common shrubs include shadscale (*Atriplex confertifolia*), Mojave saltbush (*A. spinifera*), four-winged saltbush (*A. canescens*), and allscale (*A. polycarpa*). Other shrubs found in association with saltbush scrub include budsage (*Artemisia spinecens*), winterfat, hopsage, and Anderson's boxthorn. Typically, one strongly dominant species of saltbush is found in association with a smaller number of saltbush species in a particular area. Russian thistle (*Salsola tragus*), commonly known as tumbleweed, can often be found in saltbush scrub, especially in sandy areas. A large, dense stand of this species occurs in the southwestern portion of Langford Lake, around Drinkwater Lake, and in sandier portions of the Central Corridor.

Alkali Sink Scrub

Alkali sink scrub occurs where soil salinities are very high and, as such, supports only the growth of halophytic plants. Alkali sink scrub occurs on poorly drained, usually clay soils that have a high water table and high alkalinity. The only known site of alkali sink scrub on the installation is found as a narrow ring around a dry lake west of Bitter Spring. Plant species that make up this community include iodine bush (*Allenrolfea occidentalis*), bush seepweed (*Suaeda mocquini*), and saltgrass (*Distichlis spicata*).

Seeps and Springs

Unique assemblages of low-growing perennial herbs and phreatophytic trees and shrubs occur in the vicinity of permanently wet or moist soils around seeps and springs. These types of species occur at most springs at the NTC & Fort Irwin. The volume of water and nature of the seep or spring usually dictate the abundance and diversity of the vegetation. Emergent aquatic species may include common reed (*Phragmites australis*), cattails (*Typha*), rushes (*Juncus*), and sedges (*Scirpus*). Honey mesquite, desert willow, and species of willow (*Salix*) and cottonwoods (*Populus*) are also present. Screwbean mesquite (*P. pubescens*), a species less tolerant of salt, occurs at Paradise Springs along with honey mesquite. Both species of mesquite are found at Garlic Springs, where a rich assemblage of species occurs. Equally diverse, but very different, aquatic flora occur at Two Springs and the lower zone of Leach Spring. Saltcedar (*Tamarix ramosissima*), an invasive non-native species, is widespread in California deserts and was increasing its dominance at Bitter Springs, but recent control efforts (Section 9.4.2.1) are beginning to control and perhaps eradicate this species there.

Joshua Tree Woodland

Joshua tree woodland is an open woodland that occurs on gentle alluvial slopes with well-drained sandy, loamy, or gravelly soils. The Joshua tree (*Yucca brevifolia*) is usually the only native arborescent species and, when it occurs in higher densities, constitutes a woodland setting. Associated shrub species include creosote bush, burrsage, California buckwheat, hopsage, bladdersage, and range rhatany. Joshua tree woodland is weakly developed on the NTC & Fort Irwin; it does not attain densities seen elsewhere in the Mojave. It is best developed in the northern part of Goldstone and on bajada slopes in the Avawatz Mountains.

Juniper Woodland

One stand of juniper woodland occurs on the NTC & Fort Irwin on the highest peak in the Avawatz Mountains. This community occurs on steep slopes and ridges and is a diverse assemblage of low shrubs and

small juniper trees. Associated species include California buckwheat, blackbush, desert sandwort (*Arenaria macradenia*), and needle grass.

6.6.2 Floral Inventory

Gibson and Prigge (1993) summarized previous plant surveys on the NTC & Fort Irwin and combined these species lists with species discovered during LCTA surveys and pertinent species at the Rancho Santa Ana Botanic Garden to produce a checklist for the Training Center. This list included 420 native species and 39 introduced species from 57 families. This checklist has been expanded as new species have been discovered within the boundaries of the NTC & Fort Irwin.

6.6.3 Special Status Flora

Special status species are listed as threatened or endangered, proposed for listing, candidates for listing by the state and/or federal government, California species of concern, or designated as sensitive by the BLM. Also included are plants identified by the California Native Plant Society as rare, threatened, endangered, or of limited distribution in California.

There is one federal-listed plant species on the installation, the Lane Mountain Milkvetch (*Astragalus jaegerianus*), which was federal-listed as endangered on October 6, 1998. Lane Mountain Milkvetch is a fabaceous perennial herb threatened by grazing and vehicles and potentially by maneuvers at the NTC & Fort Irwin (Skinner and Pavlik, 1994). It occurs in Joshua tree woodland and creosote bush scrub in poorly developed granitic, sandy, or gravelly soils. There is a 9-square kilometer area on the southwestern corner of the installation (just south of Goldstone, Figure 2.2) which contains this species, three square kilometers of which are on the installation with the remainder on BLM lands. Two populations are known from the Goldstone area. The Lane Mountain and Goldstone areas and the contiguous area on the NTC include the entire known existing and historic range of the species (Chambers Group, Inc., 1994).

Two State Species of Concern are included within the draft ESMP (Chambers Group, Inc., 1998). The alkali mariposa lily (*Calochortus striatus*) is found in creosote brush scrub communities in the Mojave Desert. It is a small, erect member of the lily family (Liliaceae) standing 1-4 dm high with long narrow leaves extending from the base of the plant. The flower is bell-shaped with lavender petals that are strongly purple veined. The California Native Plant Society includes the species on its list IB. As a IB-listed species, it is considered equivalent to a state endangered species. It has been reported in the California Mojave Desert in small scattered populations in Kern, Los Angeles and San Bernardino counties. Its range extends to the City of Las Vegas in western Nevada. Alkali mariposa lily grows in alkaline meadows and moist creosote brush scrub plant communities. It flowers in the spring between April and June. The alkali mariposa lily was observed near Paradise Springs (northeast of the Training Center) during a floral survey of the NTC & Fort Irwin (Gibson *et al.*, 1994).

The Mohave monkey flower (*Mimulus mohavensis*) is an annual herb of the snapdragon family (Scrophulariaceae) and is found on gravelly banks of desert washes in San Bernardino county. It grows in sandy or gravelly soils at elevations between 600 and 1,000 meters, associated with creosote brush scrub and Joshua tree woodland plant communities. It has red-purple leaves on a branching stem and reaches 15 cm in height. Its flowers are also red-purple with lighter colored margins and deep purple veins (Chambers Group, Inc., 1998). The California Native Plant Society includes the species on its IB list (Skinner and Pavlik, 1994). Because it is included on the California Native Plant Society (CNPS) IB list, it is considered equivalent to state endangered status. Mohave monkey flower has been found only in a small area of the

Mojave Desert near Barstow in San Bernardino County. It was not observed during a floral survey in 1994 (Gibson *et al.*, 1994). This species has limited suitable habitat in the badland areas of the mountain ranges within the NTC & Fort Irwin. The closest recorded observation for this species is located along Cap Rock Road near the town of Daggett.

6.6.4 Wetlands

The U.S. Congress enacted the Clean Water Act in 1972 to *restore and maintain the chemical, physical, and biological integrity of the Nation's waters*. Section 404 of the Clean Water Act delegates jurisdictional authority over wetlands to the Corps of Engineers and the Environmental Protection Agency. Waters of the United States protected by the Clean Water Act include rivers, streams, estuaries, and most ponds, lakes, and wetlands. The Corps of Engineers and the Environmental Protection Agency jointly define wetlands as .. *areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.*

Wetlands are transitional areas between terrestrial and aquatic systems, where the water table is usually at or near the surface, or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes:

- at least periodically, the land supports predominately hydrophytes;
- the substrate is predominately undrained hydric soil; and/or
- the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

The National Wetlands Inventory includes the NTC & Fort Irwin, but it has not been ground-truthed nor has any formal wetlands inventory been made of the installation. The natural springs are probably wetlands, but most of them may not be jurisdictional wetlands due to their small size. Bitter Springs is likely a jurisdictional wetland.

6.7 Fauna

In spite of its relatively uniform appearance, the NTC & Fort Irwin supports a variety of wildlife habitats when viewed on a smaller scale. Wildlife habitats are generally based on vegetation types (Section 6.6.1) that occur in a particular area. The installation consists primarily of creosote bush scrub habitat; however, each vegetation type contains similar faunal components and often supports species that occur more abundantly or solely in those habitat types. For example, the zebra-tailed lizard (*Callisaurus draconoides*) occurs in nearly all vegetation communities on the NTC & Fort Irwin, but it is more common in desert washes; the common night lizard (*Xantusia vigilis*) occurs almost exclusively in Joshua tree woodland.

Most wildlife species on the installation are adapted to desert scrub habitats that provide little cover and xeric conditions. However, seeps and springs provide perennial sources of water and a high concentration of vegetation and cover that contribute to increased wildlife diversity in these areas. Large mammals, such as the bighorn sheep, coyote, and desert kit fox, use these water sources and return to them regularly; bats typically forage over these areas because of increased abundance of invertebrate prey. The continued use of springs by wild burros has resulted in highly disturbed areas that now require maintenance. Bird species that

migrate in the spring and fall (and are not usually associated with the desert environment) may forage and rest in these areas as well as at the wastewater treatment area during their migration.

Rocky terrain, such as the Avawatz, Granite, and Tiefort mountains, as well as other mountainous and hilly ranges, provide habitat for many reptile, rodent, and bird species. Along with different vegetation communities that normally occur with increasing elevation in these ranges, differences in slope and aspect result in microhabitats that support different wildlife species. Notable species that occur in these areas include bats, which rely on rocky outcrops for roosting sites, and raptors, which use cliff faces and rocky ledges for roosting or nesting.

Playas provide little wildlife habitat because they are basically devoid of vegetation. They do contain, however, endemic microbiological communities of algae that support brine shrimp. Migratory waterfowl and large mammals may visit these areas after periods of heavy rainfall.

As is typical of most desert systems, larger animal species are uncommon, widely dispersed, and often nocturnal. Smaller mammals and reptiles, highly adapted to harsh desert conditions, are much more common, but are often either secretive, nocturnal, or active for only short periods of the year. Birds are among the most conspicuous species, usually occurring in greatest concentration in the vicinity of washes and springs where more structured and complex vegetative assemblages occur. With some exceptions, wildlife species (such as birds and larger mammals) are generally more mobile and not limited to a single habitat type. Therefore, large portions of the NTC & Fort Irwin are likely used in the course of an organism's daily and seasonal activity patterns, particularly for larger and/or more mobile species. Some species (*e.g.*, fish, amphibians, and some reptiles and mammals) are highly adapted for one habitat type and restricted to these specialized areas. Lack of specialized habitats likely contributes to the absence of native amphibian and fish populations on the installation.

Although wildlife surveys typically do not focus on invertebrate species, invertebrates are an essential component of desert ecosystems, providing food for numerous vertebrate species and acting as pollinators for a large number of plant species. The seasonal reproductive cycle of some insect species results in an "explosion" of the population in a relatively short period of time. This swarming of individuals provides an important prey base for insectivores, such as smaller birds, reptiles, amphibians, and bats.

Work begun in 1995 on the NTC & Fort Irwin by Pratt suggests that high levels of invertebrate diversity can be found in isolated areas. Because the diversity of insects is often correlated with the diversity of plants in an area, springs on the installation are particularly important to invertebrate populations. The Avawatz Mountains above 4,000 feet msl exhibit high levels of endemism for a number of insect species (G. Pratt, Dec. 12, 1996, personal communication with M. Quillman). The only known population of one subspecies of the square-spotted blue butterfly (*Euphilotes battoides ellisi*) occurs there.

Game (species that may be hunted) resources on the NTC & Fort Irwin are limited. Game species include the Gambel's quail, dove, chukar partridge, cottontail rabbit, jackrabbit, and coyote.

The NTC & Fort Irwin have a rich and diverse fauna. Various inventories have confirmed the occurrence of 187 birds, 31 mammals, 32 reptiles, 0 amphibians, and 1 fish species on the installation. An additional 92 vertebrate species are suspected to live or migrate through the installation, 73 of which are birds. The following sections summarize the biological diversity on the NTC & Fort Irwin. Each vertebrate taxonomic group is addressed. An inventory of all wildlife species known to occur on the installation is included in Appendix 6.7.

6.7.1 Mammals

Most desert mammals are nocturnal, but a few may be seen by day. Small mammals most frequently observed throughout the installation include the blacktail jackrabbit (*Lepus californicus*) and whitetail antelope squirrel (*Ammospermophilus leucurus*). Small rodent species include the desert kangaroo rat (*Dipodomys deserti*), Merriam's kangaroo rat (*D. merriami*), Panamint kangaroo rat (*D. panamintinus*), Great Basin kangaroo rat (*D. microps*), long-tailed pocket mouse (*Chaetodipus formosus*), little pocket mouse (*Perognathus longimembris*), deer mouse (*Peromyscus maniculatus*), cactus mouse (*P. eremicus*), canyon mouse (*P. crinitus*), grasshopper mouse (*Onychomys torridus*), and desert woodrat (*Neotoma lepida*) (RDN, Inc., 1995; USFWS, 1994; Recht, 1997). The Mohave ground squirrel (*Spermophilus mohavensis*) also occurs within the NTC & Fort Irwin.

Larger mammal species on the Training Center include the badger (*Taxidea taxus*), kit fox (*Vulpes macrotis*), grey fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and mountain lion (*Felis concolor*). The kit fox and coyote are expected to occur throughout the post, whereas the others are localized and fairly rare. Other large mammals on the NTC & Fort Irwin are the Nelson's bighorn sheep (*Ovis canadensis nelsoni*) and feral burros.

Mines and natural caves located throughout the installation provide potential roosting habitat for bats. Bats also use the many cliff faces and rocky ledges of mountain ranges as sites for roosting, and they have the potential to use Joshua trees as night roosts. Seven bat species were detected on the NTC & Fort Irwin during recent surveys by Brown (1994). The western pipistelle (*Pipistrellus hesperus*) and California myotis (*Myotis californicus*) were the two most commonly observed species. Bat species observed on the post are listed in Appendix 6.7 with other wildlife species.

6.7.2 Birds

Brydolf (1997) confirmed a total of 182 species, including 41 families representing 16 orders, have been observed on the NTC & Fort Irwin. This list is included in Appendix 6.7.

Most bird species that occur on the NTC & Fort Irwin are representative of creosote scrub habitat. Some common bird species include the black-throated sparrow (*Amphispiza bilineata*), rock wren (*Salpinctes obsoletus*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), and greater roadrunner (*Geococcyx californianus*). The verdin (*Auriparus flaviceps*) and black-tailed gnatcatcher (*Poliophtila melanura*) are more common in desert wash systems.

The greatest bird activity is concentrated in the immediate vicinity of water. NTC & Fort Irwin springs are a valuable resource to most resident and migratory bird species. Not only is there increased structural diversity of the vegetation and habitat, but invertebrates that become abundant in the vicinity of springs during spring and summer provide an important food source to resident species. Representative birds include the house finch (*Carpodacus mexicanus*), phainopepla (*Phainopepla nitens*), northern mockingbird (*Mimus polyglottos*), and song sparrow (*Melospiza melodia*). Numerous birds occur as winter or summer residents or migrants that occur only during brief periods in the spring and fall. Some common species include the yellow-rumped warbler (*Dendroica coronata*), Hutton's vireo (*Vireo huttoni*), cliff swallow (*Hirundo pyrrhonata*), ruby-crowned kinglet (*Regulus calendula*), and white-crowned sparrow (*Zonotrichia leucophrys*).

Red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), golden eagles (*Aquila*

chrysaetos), and prairie falcons (*Falco mexicanus*) are some raptors that occur on the installation. Many raptor species use cliff faces and rocky ledges of mountain ranges as sites to roost or nest. Owl species that occur on the NTC & Fort Irwin include the burrowing owl (*Speotyto cunicularia*), barn owl (*Tyto alba*), and short-eared owl (*Asio flammeus*).

6.7.3 Fish

Although numerous active perennial springs are located on the Training Center, no documentation exists of native fish species occurring in any springs. The introduced mosquitofish (*Gambusia affinis*) occurs in some ponds. No other native, introduced, or non-native fish species are known to occur on the installation.

6.7.4 Reptiles and Amphibians

Thirteen lizard species, 15 snake species, and one tortoise species have been observed on the NTC & Fort Irwin. These are listed in Appendix 6.7.

One amphibian species is likely to occur on the NTC & Fort Irwin; however, it has not been observed to date. The red-spotted toad (*Bufo punctatus*) is a widespread species that occurs in a variety of habitats, including desert oases and springs. Fifty tadpoles were observed just beyond the far northeastern border of the installation in a man-made cement wading pool at the Sheep Creek Spring Biological Research Station in the foothills of the Avawatz Mountains (Chambers Group, Inc., 1992b). One individual was observed at Paradise Springs in the Paradise Range just beyond the southwestern border of the NTC & Fort Irwin (MBA, Inc., 1991). No amphibians have been observed on the Training Center; however, any active spring (occurrence may be restricted at some springs by water quality) could support amphibian species, even springs that are active only part of the year.

Rich, diverse reptilian populations known to occur on the post are characteristic of those found in creosote scrub habitat. Some diurnal lizards are widespread, while others are habitat specialists. Widespread species include zebra-tailed lizards (*Callisaurus draconoides*), side blotched lizards (*Uta stansburiana*), desert spiny lizard (*Sceloporus magister*), and western whiptails (*Cnemidophorus tigris*). Other lizard species that are widespread but less abundant include the desert horned lizard (*Phrynosoma platyrhinos*), long-nosed leopard lizard (*Gambelia wislizenii*), and desert iguana (*Dipsosaurus dorsalis*). Habitat specialists include the collard lizard (*Crotaphytis insularis*), chuckwalla (*Sauromalus obesus*), long-tailed brush lizard (*Urosaurus graciosus*), and common (desert) night lizard (*Xantusia vigilis*) (Morafka, 1993; Morafka, 1997; Brown and Nagy, 1997). There are two populations of Mojave fringe-toed lizard (*Uma scoparia*) (California species of special concern), on the NTC & Fort Irwin. The main population is found in the dunes just north of Bitter Springs (Morafka, 1997). The other population is in the dunes just east of Red Pass Lake.

The desert tortoise (*Gopherus agassizii*) occurs in varying densities throughout the area (MBA, Inc., 1991; Chambers Group, 1992c; Chambers Group, 1992d). This species is listed as threatened by the USFWS and requires special management considerations. Information on this species is presented in Section 6.7.6.

Common snake species include the coachwhip (*Masticophis flagellum*), gopher snake (*Pituophis melanoleucus*), western patch-nosed snake (*Salvadora hexalepis*), western shovel-nosed snake (*Chionactis occipitalis*), and sidewinder (*Crotalus cerastes*) (MBA, Inc., 1991; Chambers Group, Inc., 1992b; Brown and Nagy, 1997). Less common species include the blind snake (*Leptotyphlops humilis*) and ground snake (*Sonora semiannulata*). Unlike lizards, most of which are primarily diurnal, most snake species on the installation are nocturnal.

6.7.5 Other Faunal Species

The NTC & Fort Irwin has begun to study its invertebrate species, particularly insects, and part of those studies involve basic inventory. Invertebrates are essential components of the desert ecosystem, and the case can be made that without these basic ecosystem building blocks (invertebrates), most animals and many, if not most, plants could not exist on the installation. Pratt and Alley (1997) are evaluating the use of invertebrates as indicators of the effects of military use on the installation, using the Langford Impact Zone as a study area. They have identified 17 arthropod species in the study area, and there likely are more than 4,000 invertebrate species on the installation. Species identified are included in Appendix 6.7.

6.7.6 Special Status Fauna

Special status faunal species are listed as threatened or endangered, proposed for listing, candidates for listing by the state and/or federal government, California species of concern, or designated as sensitive by the BLM. The installation lies wholly in the Mojave Desert and, as such, could be home to many species of birds found in the Mojave Desert. The West Mojave Coordinated Management Plan (WMCMP) (Conservation Agencies, 1995) lists many species of birds in the Mojave Desert. This management plan includes the list of NTC & Fort Irwin-confirmed and WMCMP-possible species, so habitat modeling can be used to predict if species listed in the WMCMP could be found at the NTC & Fort Irwin. Below species summaries are adapted from the WMCMP.

6.7.6.1 Federal- and/or State-listed Threatened or Endangered Fauna

Federal Endangered: any species officially listed by the U.S. Fish and Wildlife Service that is in danger of extinction throughout all or a significant portion of its range.

Federal Threatened: any species officially listed by the U.S. Fish and Wildlife Service that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

California Endangered: any species officially listed by the California Fish and Game Commission that is in danger of extinction throughout all or a significant portion of its range.

California Threatened: any species officially listed by the California Fish and Game Commission that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Peregrine Falcon (*Falco peregrinus anatum*)

Legal Status. Federal Endangered - October 1970

State Endangered - June 1971

This subspecies of peregrine falcons is found primarily in the western United States. During winter they can be found throughout most of California. Summer range is more restricted to northern California, along the coast from Santa Barbara northward, and in the Sierra Nevada Mountains. Peregrines are uncommon winter migrants to the West Mojave. The peregrine falcon was observed at Bitter Springs in 1997 (Brydolf, 1997).

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)
Willow Flycatcher (*Empidonax traillii*)

Legal Status. Southwestern Willow Flycatcher - Federal Endangered - 1995
Willow Flycatcher - State Endangered - 1990

The southwestern willow flycatcher breeds in riparian woodland habitats with willows, cottonwoods, and/or alders. A single willow flycatcher (subspecies unknown) was observed in mid-spring in the Hellwind Canyon drainage system (located in the Leach Lake Impact Area) during general wildlife surveys conducted there in 1993 and 1994 (USFWS, 1994). During avian surveys conducted on the NTC & Fort Irwin in spring 1994, several *Empidonax* species were observed during walking transects in the Avawatz area and near Bitter Springs (Brydolf, 1996). The southwestern willow flycatcher is a summer resident in the region and is not expected to occur regularly on the Training Center because of a lack of appropriate habitat. It may occur during brief periods of migration at springs and riparian areas (Chambers Group, Inc., 1998).

Least Bell's Vireo (*Vireo bellii pusillus*)

Legal Status. Federal Endangered - 1986
State Endangered - 1980

The Least Bell's vireo is a summer resident in the region and breeds in riparian habitat; it prefers areas of dense mulefat with an overstory of willows. In 1986 a Least Bell's vireo was observed on Fort Irwin at Bitter Springs (Brydolf, 1996). This species is not expected to occur regularly on the NTC & Fort Irwin because of the lack of suitable habitat. It may occur near springs for brief periods during migration.

Desert Tortoise (*Gopherus agassizii*)

Legal Status. Federal Threatened - April 1990
State Threatened - June 1989

The desert tortoise is a large, herbivorous reptile found throughout much of the Mojave and Sonoran deserts; its range roughly approximates the distribution of creosote bush scrub. The desert tortoise spends much of the year underground to avoid extreme temperatures during summer and winter. It constructs and maintains single-opening burrows, of which there may be several within an individual's home range. The desert tortoise is active in the spring, summer, and autumn when daytime temperatures are below 90°F (32°C). Most activity occurs during spring and early summer.

The USFWS determined that the Mojave population of the desert tortoise warranted listing in response to documented population declines over large portions of its range. The decline is thought to be due to a number of reasons, including upper respiratory tract disease exacerbated by the stress of several drought seasons, loss of habitat, predation by ravens, livestock grazing, and direct disturbance by humans. The USFWS emergency-listed the desert tortoise on August 4, 1989 and officially listed the Mojave population as federally threatened in April 1990 (USFWS, 1990).

The desert tortoise on the NTC & Fort Irwin is well studied. Numerous surveys have been conducted over the years to document the distribution and estimated size of tortoise populations throughout the installation (Chambers Group, Inc., 1994; Krzysik and Woodman, 1991; Woodman and Goodlett, 1990). The desert

tortoise is known to occur throughout the Training Center in low to moderate numbers with the highest concentration along the southern boundary (Chambers Group, Inc., 1996a).

California Black Rail (*Laterallus jamaicensis coturniculus*)

Legal Status. State Threatened - 1971

The California black rail is a very uncommon, local breeder inhabiting marshes, swamps, and wet meadows. Two large disjunct populations occur in California: one in the San Francisco Bay area and other along the Colorado River drainage in Imperial County. A black rail was observed at the sewage treatment ponds on the NTC & Fort Irwin during fall 1994 (Brydolf, 1994; 1997), but it has not been seen since. The occurrence of this species in the central Mojave Desert is extremely unusual.

Swainson's Hawk (*Buteo swainsoni*)

Legal Status. State Threatened - 1983

The Swainson's hawk was once a widespread breeder in the non-forested areas of northern California and the Central Valley. Conversion of the Central Valley and other grassland areas from pastureland to cropland has probably been a major factor in the population's decline (Remsen, 1978). The Swainson's hawk winters in South America. This species is migratory and is not expected to occur regularly at the NTC & Fort Irwin or forage in the area for prolonged periods. It has been observed at Bitter Springs (Brydolf, 1997).

Mohave Ground Squirrel (*Spermophilus mohavensis*)

Legal Status. State Threatened - 1971

The Mohave ground squirrel generally occurs in habitat that consists of large alluvial filled valleys with deep fine- to medium-textured soils vegetated with creosote scrub, shadscale scrub, or alkali sink scrub in the absence of desert pavement and shallow eroded soils (Aardahl and Rouch, 1985). The species is primarily granivorous, foraging on annual grasses and forbs within creosote scrub and shadscale scrub. Recent reports of Mohave ground squirrel populations at the NTC & Fort Irwin are from the Goldstone area and immediately east of the Gary Owen impact area (RDN, Inc., 1995). These surveys were concentrated in the northern and eastern portions of the installation; other populations of Mohave ground squirrels may occur in areas with suitable habitat yet to be surveyed. Previous surveys indicated the presence of this species at 12 sites, including several in the vicinity of Goldstone Lake, the Echo site, Nelson Lake, Bicycle Lake, Drinkwater Lake, the north end of Lucky Fuse, and Lizard Gulch (Krzysik, 1991). The present status of these populations is unknown.

6.7.6.2 Other Special Status Fauna

Other special status faunal species are proposed for listing, candidates for listing, California species of concern, or designated as sensitive by the BLM. This list is steadily growing for the Mojave Desert region. Including the above listed species, the list (October 1998) includes 98 plant or animal species either on the NTC & Fort Irwin or occurring in the Mojave Desert ecosystem. The WMCMP is being regularly updated with this information, and the Mojave Desert Ecosystem Program is also a source of information on these species.

The draft Endangered Species Management Plan (Chambers Group, Inc., 1998) lists 36 faunal special status species (including the threatened or endangered species listed in Section 6.7.6.1, with exception of the peregrine falcon) that are either confirmed or likely on the installation. Brydolf (1997) has confirmed the following avian California Species of Special Concern on the installation: white-faced ibis, sharp-shinned hawk, Cooper's hawk, northern harrier, ferruginous hawk, golden eagle, California gull, black tern, burrowing owl, long-eared owl, Vaux's swift, vermillion flycatcher, Bendire's thrasher, crissal thrasher, Le Conte's thrasher, loggerhead shrike, gray vireo, Virginia's warbler, yellow warbler, and yellow-breasted chat. The NTC & Fort Irwin will continue to monitor the status of these important species to take actions to protect them whenever possible.

6.7.7 Pest Species and Feral Animals

Pest management programs are described in Section 9.10.

Dogs and Cats

Feral (wild) populations of domestic cats and dogs are not a management problem on the Training Center. Cats are not likely to survive in the arid desert environment because of the lack of cover and water; therefore, they do not likely significantly impact native wildlife populations. In addition, cats that stray too far from the cantonment area are likely preyed upon by coyotes. Feral cat numbers are probably very small and restricted to the cantonment area.

Feral dogs may occur in small packs near the cantonment area. Most smaller dogs will likely become the prey of coyotes, but larger dogs may successfully join a coyote pack or group. Impacts to native wildlife populations from feral dogs are likely to be minimal because they are not well adapted to life in the desert environment. Feral dogs are more dependent on resources provided by humans than their wild canid counterparts.

Coyotes

Coyotes are wide-ranging animals that commonly occur in a variety of habitat types, including severely disturbed areas and urban edges. They frequently dig for rodents and other prey species and readily dig up refuse buried at bivouac sites. They are a nuisance at the cantonment area where they take advantage of foods in the form of trash and pet dogs and cats. Both the Pest Management Plan (Quillman, 1997) and the draft Endangered Species Management Plan (Chambers Group, Inc., 1998) for the NTC & Fort Irwin have specific recommendations for management and control of coyotes on the installation.

Burros

Many negative impacts caused by burros in the desert arise from alteration of the soil. The creation of frequently used trails, wallows (dust baths), and congregation of herds around water sources lead to lower water infiltration rates and increased compaction. In addition to soil impacts, burros directly affect vegetation and wildlife. Burros eat nearly every species of woody plant and can consume more than native herbivores (bighorn sheep). With the destruction of vegetation comes the reduction of forage, shade, and escape cover, which are important requirements affecting short- and long-term survival of many wildlife species.

A Feral Burro Management Plan was developed in 1982 in cooperation with the BLM and the China Lake Naval Air Weapons Station to eliminate feral burro herds on their respective lands. This project, which was

very successful, continued until 1991. However, two populations totaling approximately 70 feral burros now occur on the NTC & Fort Irwin in the Leach Lake area and at Bitter Springs. The burros are a management concern because of negative impacts on soils, vegetation, and water quality.

Common Ravens

Common raven populations have been increasing in the Mojave Desert. Data from the USFWS Breeding Bird Survey covering 1968 to 1992 show a tenfold increase in raven numbers in the Mojave Desert (Boarman and Berry, 1994). Conditions at the NTC & Fort Irwin conducive to increasing the number of ravens in the desert include availability of road kills, permanent water supplies, a supplementary food supply at the landfill, and permanent structures that provide nesting and roosting sites. Because ravens are known to prey on juvenile desert tortoises, increases in raven numbers could have negative impacts on the desert tortoise populations on the NTC & Fort Irwin.

7.0 LAND USE AND MANAGEMENT UNITS

7.1 Land Uses

Primary land uses at the NTC & Fort Irwin can be divided into four overall areas: the NTC Downrange Operations Area, Cantonment Area, Leach Lake Gunnery Range, and Goldstone Deep Space Communications Complex. Figure 2.2 shows these major land areas and the three training corridors and their impact areas within the Downrange Operations Area. Acreages⁹ of these units are shown in the box.

7.1.1 NTC Downrange Operations Area

The NTC portion of Fort Irwin is divided into three regions, each representing a major training area. Task force live-fire exercises are conducted primarily north of the Granite Mountains (the northern corridor). South of the Granites and north of Tiefert Mountain is the central corridor, and south of the Tiefert is the southern corridor. The majority of force-on-force maneuvers take place in the central corridor. The southern corridor is used primarily for staging and also for maneuver training (U.S. Army, National Training Center and Fort Irwin, 1993). The southern corridor includes about 20,000 acres of desert tortoise critical habitat, which significantly reduces the corridor's value for military training. Impact areas that receive the majority of live fire during training exercises are restricted-access and/or no-digging restricted, and force-on-force training is excluded from these areas. The four impact areas are Langford Lake, Lucky Fuse, Nelson, and Gary Owen.

| | |
|--------------------------------|-------------------------|
| NTC Downrange Operations Area* | 501,551 ac (202,972 ha) |
| Leach Lake Gunnery Range | 92,625 ac (37,484 ha) |
| Goldstone Complex | 33,241 ac (13,452 ha) |
| Cantonment Area | 15,314 ac (6,197 ha) |
| Total Land | 642,731 ac (260,105 ha) |

* Includes acreages not available for training due to environmental, cultural, and recreational constraints.

7.1.2 Cantonment Area

The cantonment area is located in the southwestern portion of the NTC & Fort Irwin. Day-to-day operations, administrative activities, family housing and neighborhood parks, barracks, maintenance yards, indoor recreation, restaurant facilities, and equipment posts are located in this area. Recreation and other facilities within the cantonment area operate independently of military activities on the installation except that facility use depends primarily on the rotational schedule of NTC troops.

The cantonment area is nearly completely developed. The extent and quality of the landscaping varies, especially among the housing facilities where residents maintain their own yards. Some facilities are landscaped and are regularly maintained, while others either are not landscaped or need maintenance.

⁹ Acreages may differ from other published reports due to different measuring and categorization systems.

7.1.3 Leach Lake Gunnery Range

The Leach Lake Gunnery Range covers most of the northern edge of the NTC & Fort Irwin and the Leach Lake Basin. Since 1967 this Range has been used by the U.S. Air Force (and the U.S. Navy and U.S. Marine Corps) year-round for air-to-air and air-to-ground gunnery and as an east-west, low-level flight corridor. Virtually all types of U.S. military aircraft (fighters and bombers) use Leach Lake. Air Force use averages 18 days monthly (U.S. Army, National Training Center and Fort Irwin, 1993).

The Leach Lake Gunnery Range is extensively contaminated with unexploded ordnance, which has been deposited since World War II. Unexploded ordnance ranges from 2,000-pound bombs to highly sensitive cluster bombs. The Range is undergoing large-scale unexploded ordnance removal.

7.1.4 Goldstone Deep Space Communications Complex

The NASA Goldstone Deep Space Communications Complex and satellite tracking facility is operated by the Jet Propulsion Laboratory. There are few military training options available on Goldstone, but it has significant value in terms of natural resources, primarily due to virtually no land impacts beyond facilities and roads. During critical NASA missions at Goldstone, military use is curtailed almost completely, and some restrictions include other portions of the Training Center. The NTC & Fort Irwin has ultimate responsibility for the management of natural resources on Goldstone, but NASA has its own environmental program for the area.

7.1.5 Surrounding Land Use

Figure 2.1 indicates land use areas adjacent to the NTC & Fort Irwin. The installation is bordered to the west by China Lake Naval Air Weapons Station. Lands at China Lake adjoining the NTC & Fort Irwin are used for air-to-ground gunnery and a variety of research, development, testing, and evaluation of Navy air weapons. With exception of the aerial gunnery range on the southern edge of China Lake, most of the area has few ground-disturbing impacts, and there is a requirement for a highly controlled emission environment (both dust and electronic) on station to support research requirements.

To the north of the NTC & Fort Irwin and east of China Lake is a small strip of BLM land with Death Valley National Park to the north of the BLM strip of land. There are a few isolated parcels of State land within the BLM area (school lands). The narrow strip of BLM land is classified as Limited Use, on which only low-intensity uses are permitted. This strip is designated the Death Valley National Park Wilderness Study Area (WSA). National Park lands are highly protected with few uses that negatively impact natural resources (U.S. Army Corps of Engineers, Los Angeles District, 1996).

The eastern border of the Training Center is mostly BLM land interspersed with State school lands. The area adjacent to the northeastern corner of the NTC & Fort Irwin is the Avawatz Mountains WSA, and the area to the south of the Avawatz Mountains WSA (excluding the Silver Lake Road and a few adjacent parcels) is the South Avawatz Mountains WSA. The area on the southeastern border of the installation is the Soda Mountains WSA (excluding a power transmission line corridor along the post boundary and south of the South Avawatz Mountains WSA). Most of these BLM lands are designated Limited Use with two small northeastern-adjacent parcels designed as moderate use (controlled balance between higher intensity use and protection). The BLM has an Area of Critical Environmental Concern, Denning Springs, just to the northeast of the northeastern corner of the Training Center. Much of the Soda Mountains WSA is within a

BLM-administered grazing lease (U.S. Army Corps of Engineers, Los Angeles District, 1996).

To the south of the NTC & Fort Irwin is mostly BLM land with small, interspersed parcels of privately-owned land and a few State school land parcels. BLM land to the immediate south is designated as moderate use, and BLM land to the southwest is designated as limited use. BLM lands to the southwest of the NTC & Fort Irwin are within two BLM-administered grazing leases (U.S. Army Corps of Engineers, Los Angeles District, 1996).

7.2 Management Units

7.2.1 Training Areas

Figure 7.2.1 shows training areas and their acreages on the NTC & Fort Irwin. The installation recently reconfigured its traditional 22 training areas into 68 training areas.

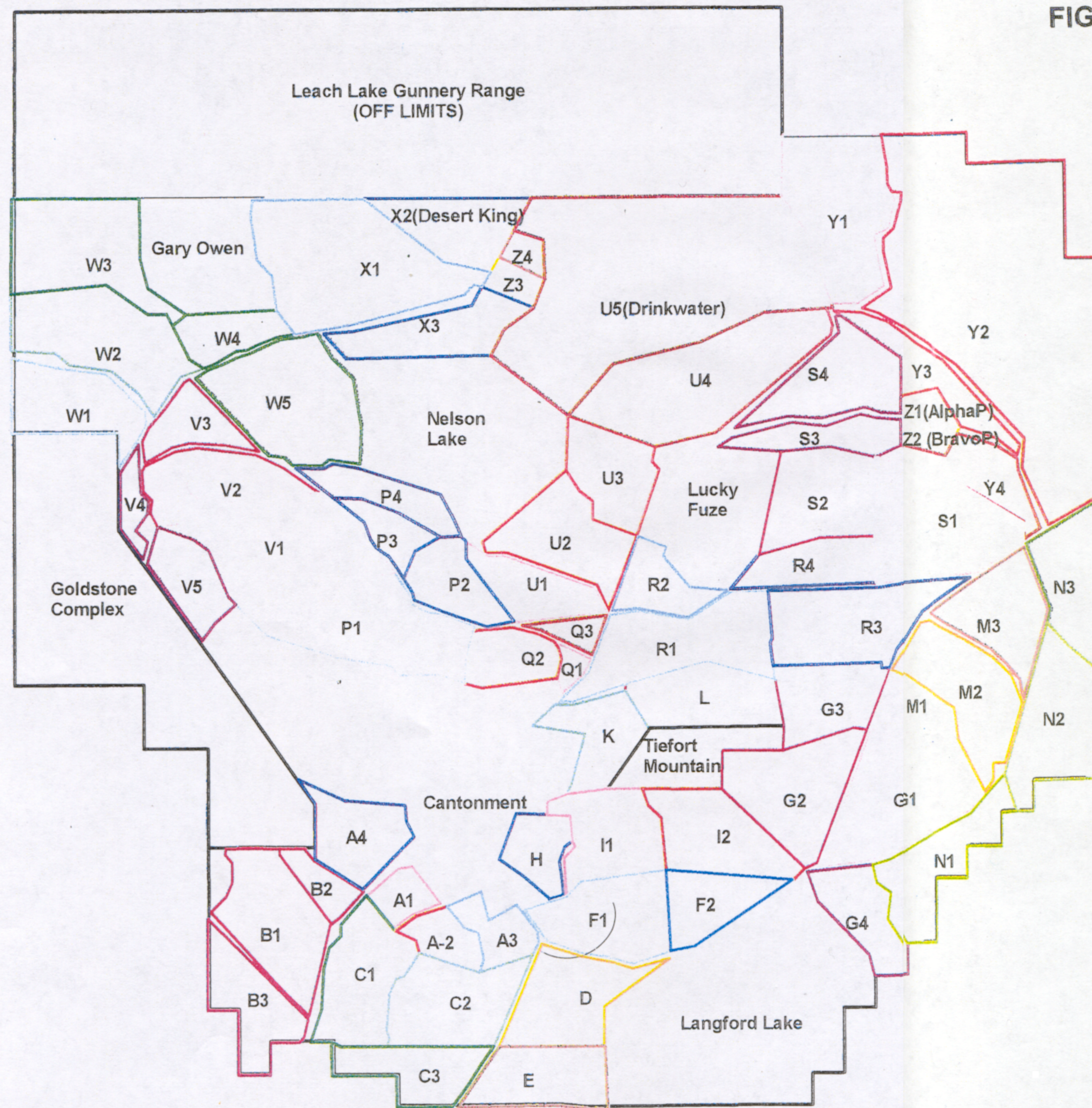
7.2.2 Natural Resources Management Areas

Training areas are recognized by military units, and their use is tightly controlled. Since much of the management of natural resources is dependent upon activities associated with military training, there is little reason to impose management area boundaries differing from training area boundaries for natural resources management. Thus, training areas are the basic management unit at NTC & Fort Irwin.

7.3 Proposed Expansion Areas

The proposed Land Acquisition and Expansion Area is not managed by the NTC & Fort Irwin because it is not yet under the Army's jurisdiction. The Draft Environmental Impact Statement was released to the public in January 1997. Inclusion of management recommendations for the acquisition area are therefore beyond the scope of this INRMP. If an acquisition occurs and sufficient information regarding the natural resources of new lands is available, an addendum to this document that addresses management concerns within the acquired area will be developed.

FIGURE 7.2.1: Training Areas on the National Training Center and Fort Irwin



Training Areas - Acreage

| |
|-----------|
| A2 - 1963 |
| A1 - 1501 |
| A3 - 2228 |
| A4 - 4181 |
| B1 - 6995 |
| B2 - 1658 |
| B3 - 4744 |
| C1 - 5989 |
| C2 - 6233 |
| C3 - 4102 |
| D - 5787 |
| E - 4840 |
| F1 - 5920 |
| F2 - 3568 |
| G1 - 8715 |
| G2 - 7101 |
| G3 - 4547 |
| G4 - 3650 |
| H - 2601 |
| I1 - 5353 |
| I2 - 5906 |
| K - 3778 |
| L - 5189 |
| M1 - 2412 |

| |
|------------|
| M2 - 6420 |
| M3 - 5002 |
| N1 - 5453 |
| N2 - 7008 |
| N3 - 4876 |
| P1 - 10497 |
| P2 - 3488 |
| P3 - 1930 |
| P4 - 2931 |
| Q1 - 581 |
| Q2 - 2987 |
| Q3 - 945 |
| R1 - 7817 |
| R2 - 2842 |
| R3 - 7350 |
| R4 - 3561 |
| S1 - 8446 |
| S2 - 6050 |
| S3 - 2889 |
| S4 - 5571 |
| TIEFORT |
| U1 - 3530 |
| U2 - 5881 |
| U3 - 4612 |
| U4 - 11834 |

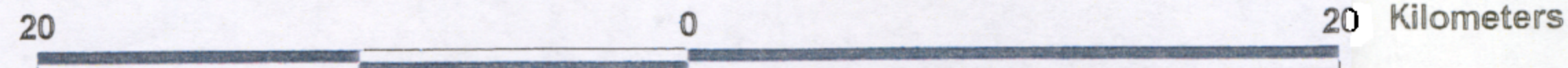
| |
|------------------------|
| U5(Drinkwater) - 28803 |
| V1 - 8286 |
| V2 - 5231 |
| V3 - 2752 |
| V4 - 1190 |
| V5 - 3307 |
| W1 - 5314 |
| W2 - 8350 |
| W3 - 8233 |
| W4 - 2770 |
| W5 - 9262 |
| X1 - 12998 |
| X2(Desert King) - 4638 |
| X3 - 4722 |
| Y1 - 8910 |
| Y2 - 34542 |
| Y3 - 3541 |
| Y4 - 3653 |
| Z1(AlphaP) - 1183 |
| Z2 (BravoP) - 891 |
| Z3 - 1098 |
| Z4 - 841 |
| Goldstone Complex |
| NTC Boundary |



Scale 1:250,000



Produced by the NTC,
ITAM Office, 3 May 99.



8.0 INVENTORY AND MONITORING

The first step in biodiversity protection is to prepare an inventory. Inventory, as used here, is developing an itemized list or catalogue of components of an ecosystem. This process has been ongoing for many years on the NTC & Fort Irwin, primarily driven during early years by the Endangered Species Act and more recently by implementation of the ITAM program. This INRMP continues the process of conducting basic inventories of the installation's natural resources. In general, these have been termed Planning Level Surveys, and they are high-priority projects in the budgeting system.

Monitoring is used to identify trends (or absolute numbers if needed) of individual species or higher associations of species, such as vegetation cover types or plant communities. Monitoring is generally performed on a regular basis and often targets species with high economic or human-use values, endangered species, and indicator species of overall ecosystem health.

The NTC & Fort Irwin ITAM program collects considerable monitoring and inventory data as part of studies to determine plant and animal species, which are indicators of ecosystem damage as a result of military activities and recovery from this damage. The NTC and Fort Irwin natural resources program inventories and monitors soil, water, and endangered species. The DPW and ITAM staffs cooperate to collect and distribute natural resource information. Both inventory and monitoring data are used to evaluate general and site-specific ecosystem integrity. As such, they are used as integral building blocks to provide military trainers with recommendations on land use. The purpose of this process is to maintain or improve the land condition to sustain high quality training and protect vital resources.

The NTC & Fort Irwin's natural resources monitoring program utilizes a variety of techniques to assess land condition. Techniques are both qualitative and quantitative. In general there are monitoring plots located throughout post that are regularly sampled. Qualitative plots rely mostly on the experience of field personnel and can be subjective. These qualitative plots provide a quick assessment of an area, and management actions are prioritized based upon those assessments. Quantitative plots are used to monitor long-term trends in land condition as they relate to training. The information is used in developing long-term training and management plans.

General Goal 1. Inventory NTC and Fort Irwin natural resources and regularly monitor resources that are indicators of overall ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

General Goal 2. Analyze inventory and monitoring data to implement an adaptive management strategy, using landscape level monitoring protocols.

General Goal 3. Provide data and other input to regional Mojave Desert conservation initiatives.

8.1 Flora Inventory and Monitoring

Goal. Inventory the NTC's and Fort Irwin's floral resources and monitor species or communities that are indicators of ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

8.1.1 Land Condition Trend Analysis

The application of Land Condition Trend Analysis (LCTA) data will:

- reduce the need for expensive land rehabilitation programs,
- reduce some subjectivity from land management decisions,
- help ensure the sustained availability and productivity of Army lands, and
- provide input for implementing this INRMP and preparing NEPA and other environmental documents.

LCTA uses a wide array of natural resources data, such as soils, canopy cover, disturbance levels, etc., to determine condition of land and trends in that condition, emphasizing effects of the conduct of the military mission. Tazik et al. (1992) describe procedures for the standard LCTA plot inventory. During early years of LCTA implementation these procedures were modified for conditions at the NTC & Fort Irwin.

LCTA was initiated on NTC & Fort Irwin in 1990 with 200 allocated core plots for long-term comparisons. Core plots were allocated using vegetation and satellite imagery to produce a stratified random allocation. LCTA core plots were designed to be intensively monitored on a long-term basis. Frequency of intensive monitoring is dependent upon management objectives and the amount of change occurring annually on the installation. The 200 core plots were annually monitored using the long-term, intensive technique in 1990-93. 162 of these 200 plots were relocated in 2000 and will form the basis of continued monitoring in the future. Plot distribution was evaluated in light of current NTC & Fort Irwin data-layers, and additional plots will be added to provide adequate sampling.

Between 1994 and 1997 LCTA plots were monitored on a five-year rotation with the objective of monitoring 20% of the plots annually. This process encountered several problems, including difficulties locating sites, often associated with the destruction of site markers, and difficulty in data analysis due to inconsistencies in data collection. LCTA efforts include the following general projects, lumped under the title of *Biological Monitoring and Environmental Impact Assessment* (Dominguez Hills Corporation, 1997):

Special Use Plots

Special use plots were used from 1995 through 1999 to evaluate land condition in locations other than the original LCTA sites and/or to use different monitoring protocols. They have primarily been used to quantify known military impacts on plants and animals to determine which plant and animal species abundance and condition changes are reliable indicators of effects of military training. Special use plots are typically laid out in a treatment and control array (high, medium, and low military impacts). Examples of these studies include Prigge and Ferrus-Garcia (1997), Gibson *et al.* (1997), Pratt and Alley (1997), Morafka (1997), Brown and Nagy (1997), Brydolf (1997), and Recht (1997).

Site Rehabilitation Prioritization (SRP)

SRP provides qualitative assessments of maneuver damage using before and after training event evaluations. Information on vegetation, disturbance, area, severity of erosion, proximity to critical areas, etc. is collected by inhouse personnel. This information is used to provide priorities for LRAM projects to repair damaged training lands. About 100 SRP assessments were completed in 1996 and 1997.

Remote Sensing

Landsat imagery does not accurately portray vegetation in the Mojave Desert due to technology shortfalls involving the use of six widely spaced bands. A remote sensing study (Lee *et al.* (1997) on the NTC & Fort Irwin is using SPOT panchromatic imagery and Landsat TM imagery to determine disturbed sites using surface reflectance. The ITAM program completed a digital orthophotography project in 1997. The objective is to produce a classified disturbance map to help identify and prioritize LRAM projects and provide land condition trend information.

8.1.1.1 Proposed Action

Goal. Provide land managers and trainers with long-term assessments of changes in vegetative cover and botanical composition under varying levels and types of use.

Objective 1. Reallocate plots based on updated soils, vegetation, and training area maps.

Objective 2. Continue long-term monitoring on re-allocated plots during 2001 through 2004.

Objective 3. Use results from phases 1 and 2 for future ground-truthing analyses of new and existing remote sensing imagery.

Objective 4. Incorporate training activity data (from RFMSS and others) to link vegetation change to known military impacts.

Long Term Objective 5. Develop a model to predict effects of military training on vegetation.

Long Term Objective 6. Use remote sensing (with ground truthing) to determine effects of military training (*i.e.*, change analysis).

Objective 7. Update the floral inventory as new species are found during LCTA surveys.

Objective 8. Provide LCTA data to regional Mojave Desert initiatives, particularly the Mojave Desert Ecosystem Program (MDEP).

Objective 9. Explore new technology (low-level aerial photography and scanning software) for conducting vegetation surveys.

8.1.1.2 Other Management Options

The Sikes Act requires no loss in the capability of the lands to support the military mission. This, in turn, implies a legal requirement to monitor the effects of military activities. Thus, not monitoring is not a viable option. However, the degree to which LCTA is used provides options. The NTC & Fort Irwin is classified as a Class I installation in terms of ITAM implementation; thus, it is not feasible to expend a greater effort on LCTA. A lesser degree of implementation is possible, but this would not meet the needs of the installation. There are numerous other land condition monitoring programs used by other agencies, but none are specifically designed to monitor effects of military activities on desert landscapes. They would be less effective.

8.1.1.3 Proposed Land Expansion

LCTA is being used to evaluate various land expansion options, and there are plans (U.S. Army, National Training Center and Fort Irwin, 1997a) to use LCTA technologies to evaluate impacts of military training on lands acquired during the land expansion process. However, these evaluations and plans involve lands currently beyond the boundaries of the NTC & Fort Irwin, and thus, they are not part of this INRMP. The INRMP will be modified as necessary to include this program when land expansion becomes reality.

8.1.2 Flora Surveys

The floral inventory (Gibson and Prigge, 1993), as updated with other studies including a map based program for querying known locations of plant species found on the NTC & Fort Irwin and physiology/stress work and species specific studies, is adequate for NTC & Fort Irwin needs during the next five years. Various ongoing vegetative studies at the NTC & Fort Irwin (Prigge and Ferrus-Garcia, 1997; Gibson *et al.*, 1997) are likely to discover additional plant species on the installation. Herbarium mounts are useful for identifying plants during LCTA surveys and other field projects.

8.1.2.1 Proposed Action

Goal. Identify flora of the NTC & Fort Irwin as part of the natural resources baseline data.

Objective 1. Update the flora inventory (including herbarium mounts) as new species are found during LCTA surveys, site-specific surveys, sensitive plant species surveys, and other projects.

Objective 2. Provide floral data to regional Mojave Desert initiatives, particularly the MDEP.

Objective 3. Develop and maintain a computerized plant checklist.

8.1.2.2 Other Management Options

There is no legal requirement for maintaining a floral inventory. Thus, the option to not maintain or expand this inventory is viable. At the other extreme, the Army could expend a great deal of effort specifically developing a more complete floral inventory. However, considering that the existing floral inventory is steadily growing as a by-product of other vegetative projects, the current level of inventory adequately supports the overall natural resources program.

8.1.3 Rare or Endangered Plant Monitoring

The Lane Mountain Milkvetch is the only federal- or State-listed threatened or endangered plant species on the installation. The NTC & Fort Irwin draft Endangered Species Management Plan (ESMP) (Chambers Group, Inc., 1998) provides monitoring programs for the Lane Mountain Milkvetch and two State-listed species of concern (alkali mariposa lily and Mohave monkey flower), which are confirmed very close to the Training Center and may be on the installation.

8.1.3.1 Proposed Action

Extensive plant surveys of the eastern outwash of the Paradise Range were conducted for Lane Mountain

Milkvetch in 1992. The Lane Mountain and Goldstone areas and the contiguous area on the Training Center include the entire known existing and historic range of the species (Chambers Group, Inc., 1994). Surveys to better identify the distribution and abundance for this information would be useful for the determination of potential effects on military activities and to determine the impact of this species on future land acquisitions that might involve the area to the southwest of the installation.

Extensive plant surveys were conducted throughout the NTC & Fort Irwin in 1994 (Gibson *et al.*). The alkali mariposa lily was observed northeast of Paradise Mountain Range but was not observed on the Training Center. The Mohave monkey flower has not been observed on the installation, but some potential habitat does exist on the Training Center. Surveys specific to these two species on the NTC & Fort Irwin could resolve issues regarding their presence and the need for protection on the installation.

Goal 1. Identify all populations of Lane Mountain Milkvetch and Lane Mountain Milkvetch habitat on the NTC & Fort Irwin and establish baseline milkvetch population densities for each site.

Objective. Survey for Lane Mountain Milkvetch, both on and adjacent to the NTC & Fort Irwin.

Goal 2. Monitor other federal-listed plant species if they are discovered on the NTC & Fort Irwin or added to the list.

Objective. Consult with the USFWS and establish survey and monitoring programs for other federal-listed plant species if they are discovered on the NTC & Fort Irwin or added to the list.

Goal 3. Monitor State-listed threatened, endangered, or species of concern plant species if they are discovered on the NTC & Fort Irwin or added to the list, as determined by available funding.

Objective 1. Identify all populations of alkali mariposa lily and its habitat on the NTC & Fort Irwin and establish a baseline of mariposa lily population densities for each site.

Objective 2. Identify all populations of Mohave monkey flower and its habitat on the NTC & Fort Irwin and establish a baseline of monkey flower population densities for each site.

Objective 3. Consider establishing survey and monitoring programs for State-listed plant species, in consultation with the CDFG, if they are discovered on the NTC & Fort Irwin or added to the list during 1999-2003.

8.1.3.2 Other Management Options

There are no other legal options for federally-listed plant inventory and survey, such as the Lane Mountain Milkvetch. For State-listed species, such as the alkali mariposa lily and the Mohave monkey flower, the option to not survey or give any consideration to these species is viable. At the other extreme is the option to treat these species the same as federally-listed species. This would be extremely expensive, could significantly affect the military mission, and would be contrary to Army policy (AR 200-3). Army funding would not be available to support this option.

8.1.4 Wetlands

The NTC & Fort Irwin has no particular need for wetland surveys since all potential wetland sites are well known and few in number. If any proposed activity has the potential to affect these areas, site-specific wetland surveys will be conducted to determine the presence of jurisdictional wetlands. Such proposed activities are unlikely considering the high degree of protection of wet areas on the installation.

8.1.4.1 Proposed Action

Goal. Maintain a baseline database on wetland resources at the NTC & Fort Irwin.

Objective. Use site-specific surveys to evaluate wetland resources if potential wetland impacts are proposed.

8.1.4.2 Other Management Options

There are no legal alternatives to conducting jurisdictional wetland surveys when proposed actions may affect wetlands. Considering that the NTC & Fort Irwin knows the locations of wetlands (jurisdictional or otherwise) on the installation, there is no need for additional wetland surveys.

8.2 Fauna Inventory and Monitoring

Fauna inventory and monitoring on the NTC & Fort Irwin are accomplished primarily as part of either the identification and protection of sensitive species (within DPW) or a search for indicators of the effects of military activities on the Mojave Desert ecosystem (within G3 Training). DPW, with assistance from Range Control, monitors the numbers of harvested (and hunter-observed) doves, rabbits, and chukars, but these are not valid estimates of population size or changes.

Goal. Inventory the NTC's and Fort Irwin's faunal resources and regularly monitor species that are indicators of ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

8.2.1 Species Other Than Federal- or State-listed Threatened or Endangered Species

8.2.1.1 Proposed Action

8.2.1.1.1 Mammals

Small mammals have been inventoried as part of a study evaluating the use of small mammal abundance and distribution as bioindicators of the impacts of military activities on desert habitats. Brown (1994) conducted a bat survey on the installation. Other small mammal surveys to date have either been part of ITAM (LCTA) implementation (RDN, Inc., 1995) or incidental observations as part of other activities. Small mammal traps are shaded by cardboard shelters and set in compliance with regulations protecting the Mohave ground squirrel.

The CDFG has been monitoring Nelson's bighorn sheep in the Avawatz mountain range. About half of the 76 individuals are radio-collared, and locations are recorded. The CDFG introduced two males to the population to improve the sex ratio, and the population has increased. This population moves on and off the

NTC & Fort Irwin. The CDFG provides the Natural and Cultural Resources Program Manager a monthly report of this species' movements relative to the installation.

The 1994 bat survey (Brown) noted the presence of solitary Townsend's western big-eared bat (*Plecotus townsendii townsendii*) males, suggesting that a maternity colony is in the vicinity. This is a State-listed species of special concern.

Objective 1. Continue to inventory and monitor small mammals in conjunction with a study (Recht, 1997) to evaluate small mammals as indicators of the impacts of military training on desert habitats, at least through 1999.

Objective 2. Cooperate with the CDFG to monitor Nelson's bighorn sheep.

Objective 3. Survey the 10 spring areas, which includes critical foraging habitat for bats, at least once during the 2001-2005 to determine changes in bat populations in these areas (Chambers Group, Inc., 1998).

Objective 4. Evaluate the option to survey mines around the perimeter of the Training Center to locate Townsend's western big-eared bat maternity roosts (Brown, 1994).

Objective 5. Continue to add to the small mammal baseline inventory using observations and data from other field projects.

8.2.1.1.2 Birds

Birds have been inventoried using walking transects and spot birding as part of a study evaluating the use of bird abundance and distribution as bioindicators of the impacts of military activities on desert habitats (Brydolf, 1994; 1997). Spot birding plots are locations of special interest or unique habitats. Walking transects are a modification of the USFWS Breeding Bird Survey. Other avian surveys to date have either been part of ITAM (LCTA) implementation or incidental observations as part of other activities.

Objective 6. Continue to inventory and monitor birds in conjunction with a study (Brydolf, 1997) to evaluate birds as indicators of the impacts of military training on desert habitats, at least through 1999.

Objective 7. Survey the 10 spring areas that have been set aside as migratory bird habitat (Jack Springs, Garlic Springs, Bitter Springs, Leach Springs, Desert King Springs, Two Springs, Drinkwater Springs, Devouge Springs, Cave Springs, and one unnamed spring), which includes crucial habitat for many sensitive avian species, at least once during the 2001-2005 period to determine changes in migratory bird populations in these areas (Chambers Group, Inc., 1998).

Objective 8. Continue to add to the avian baseline inventory using observations and data from other field projects.

8.2.1.1.3 Fish

Unless there becomes reason to suspect the presence of fish species, with exception of the introduced mosquitofish, on the NTC & Fort Irwin, there is no justification for inventory or monitoring of fish on the installation.

8.2.1.1.4 Reptiles and Amphibians

The only amphibian likely to occur on the NTC & Fort Irwin is the red-spotted toad, but there are no projects planned to specifically survey for this species. Reptiles have been inventoried as part of studies evaluating the use of reptiles as bioindicators of the impacts of military activities on desert habitats (Morafka, 1993 and 1997; Brown and Nagy, 1997).

The Mojave fringe-toed lizard is found near Bitter Springs and in the dunes just east of Red Pass Lake on the installation. This species is closely related to the Coachella Valley fringe-toed lizard (*Uma inornata*), which is State-listed as threatened. Thus, there is interest in the Mojave fringe-toed lizard, particularly in its genetic makeup. Other reptile surveys to date have either been part of projects involving the desert tortoise, ITAM implementation, or incidental observations as part of other activities.

Objective 9. Continue to inventory and monitor reptiles in conjunction with studies (Morafka, 1997; Brown and Nagy, 1997) to evaluate reptiles as indicators of the impacts of military training on desert habitats, at least through 1999.

Objective 10. Determine the distribution of the Mojave fringe-toed lizard on the NTC & Fort Irwin and determine if the two known populations are genetically identical.

Objective 11. Continue to add to the amphibian and reptile baseline inventory using observations and data from other field projects.

8.2.1.1.5 Invertebrates

Invertebrates have been inventoried as part of studies evaluating the use of these species as bioindicators of the impacts of military activities on desert habitats (Pratt and Alley, 1997). There has been no systematic survey for invertebrates on the installation with exception of this study. It is difficult to justify a general survey for invertebrates at this time.

Objective 12. Continue to inventory invertebrates in conjunction with a study (Pratt and Alley, 1997) to evaluate invertebrates as indicators of the impacts of military training on desert habitats, at least through 1999.

Objective 13. Develop an invertebrate species list from the Pratt and Alley study (1997) and observations and data from other field projects.

8.2.1.2 Other Management Options

None of the above projects involving the collection of faunal inventory and related data is required by law. However, many are related to complying with the Sikes Act requirement to maintain the quality of training on the NTC & Fort Irwin. Monitoring with bio-indicator species has a legal basis, but these projects could be dropped if there were other proven means to monitor the land's capability to support the military mission. The NTC & Fort Irwin is classified as a Class I installation in terms of ITAM implementation; thus, it is not feasible to expend a greater effort on LCTA, under which most studies listed above are funded. A lesser degree of the use of faunal indicators is possible, and this option might be considered when these studies are completed.

Surveys for species which are monitored for biodiversity purposes, such as bats at springs, could be decreased or dropped, or they could be increased in terms of geographical areas surveyed or survey intensity. It is a matter of budgets, personnel, and species priority, not legal requirements.

There are numerous other fauna inventory and monitoring techniques available for use in the Mojave Desert. These could be used to any degree on the NTC & Fort Irwin. However, considering declining DoD budgets and increasing mandatory compliance programs, it is unlikely that significantly more faunal surveys or monitoring programs can be justified for species that are not listed.

8.2.2 Federal- or State-listed Threatened or Endangered Species

8.2.2.1 Proposed Action

The NTC & Fort Irwin draft ESMP (Chambers Group, Inc., 1998) provides monitoring programs for federal- or State-listed fauna. Below discussions are taken from that draft ESMP.

8.2.2.1.1 Desert Tortoise

Extensive presence/absence surveys were conducted for desert tortoise throughout the NTC & Fort Irwin in 1989, 1990, and 1991 (Woodman and Goodlett, 1990; Krzysik and Woodman, 1991). More recent surveys (1992 and 1993) conducted for the desert tortoise were primarily in the southern boundary region (Chambers Group, Inc., 1994). Dr. Kristen Berry (USGS/BRD, Riverside, CA) evaluated isolated pockets of desert tortoise in 1995 through 1999. Determining specific conservation goals and evaluating their success will be difficult without an accurate, up-to-date census of the desert tortoise population on the installation. Survey requirements are based on the Biological Opinion (USFWS, 1995).

Goal 1. Identify all populations of desert tortoises and desert tortoise habitat on the NTC & Fort Irwin and establish a current baseline for tortoise population densities in management areas.

Objective 1. Survey the entire Southern Boundary, Goldstone, and other probable locations of desert tortoise habitat every five years (required by the Biological Opinion (USFWS, 1995)), using one-fifth of the total acreage surveys each year, to determine desert tortoise population densities.

Objective 2. Survey potential relocation areas to determine areas of low tortoise populations to be used for translocation (see Section 9.5.2.2).

Goal 2. Continue research on upper respiratory tract disease as required in the Biological Opinion for the current mission at the NTC.

Objective 1. Continue research on the cause of the disease and possible cures.

Objective 2. Continue to develop an "in-the-field ELISA Test" for determining the presence of desert tortoises prior to relocation into possible non-upper respirator tract disease-affected areas.

Goal 3. Initiate a long-term (25-year) life history study on the desert tortoise.

Objective 1. Initiate a long-term life history study on the NTC & Fort Irwin and in the proposed expansion area under the direction of the U.S. Geological Survey, Biological Resources Division, monitoring the effects

of military training on the desert tortoise.

Objective 2. Initiate a long-term life history study at two Mohave Desert locations to be used as controls for life history studies on the NTC.

Goal 4. Initiate a long-term life history physiology study on the desert tortoise at the same locations as the life history studies.

Objective. Determine effects of military training on physiological parameters of healthy desert tortoises and upper respiratory tract disease-infected desert tortoises by measuring effects of upper respiratory tract disease on egg production, clutch size, survivorship, energy budgets, etc.

Goal 5. Increase the database on desert tortoise hatchlings and neonates by continuing research at the Fort Irwin Study Site.

Objective. Continue to fund predation rate studies by Dr. Morafka at the Fort Irwin Study Site. Studies will include determining appropriate release times from head-start pens and evaluating the viability of using head-start pens to aid in recovery of the desert tortoise in areas where they have been extirpated.

8.2.2.1.2 Willow/Southwestern Willow Flycatcher

Extensive biological surveys were conducted for all avian species, including flycatchers, throughout the NTC & Fort Irwin in 1993 and 1994 to determine the presence of avian species, but no focused willow/southwestern willow flycatcher surveys have been conducted on the installation.

Goal 1. Identify all populations of willow/southwestern willow flycatchers, their habitat, and areas of potential use during migration on the NTC & Fort Irwin.

Objective. Inventory willow/southwestern willow flycatchers at the 10 spring areas that have been set aside as migratory bird habitat (Jack Springs, Garlic Springs, Bitter Springs, Leach Springs, Desert King Springs, Two Springs, Drinkwater Springs, Devouge Springs, Cave Springs, and one unnamed spring), which includes southwestern willow flycatcher crucial habitat, at least once during the 2001-2005 period.

Goal 2. Determine if willow/southwestern willow flycatchers are nesting on the Training Center or only utilizing areas on the installation for brief periods during migration.

Objective. Conduct nesting surveys for willow/southwestern willow flycatchers at the 10 spring areas at least once during the next five years.

8.2.2.1.3 Least Bell's Vireo

Extensive biological surveys were conducted for all avian species, including the Least Bell's vireo, throughout the NTC & Fort Irwin in 1993 and 1994 to determine the presence of avian species, but no focused Least Bell's vireo surveys have been conducted on the installation.

Goal 1. Identify all populations of Least Bell's vireos, their habitat, and areas of potential use during migration on the NTC & Fort Irwin.

Objective. Inventory Least Bell's vireos at the 10 spring areas that have been set aside as migratory bird habitat (Jack Springs, Garlic Springs, Bitter Springs, Leach Springs, Desert King Springs, Two Springs, Drinkwater Springs, Devouge Springs, Cave Springs, and one unnamed spring), which includes least Bell's vireo crucial habitat, at least once during the 2001-2005 period.

Goal 2. Determine if Least Bell's vireos are nesting on the Training Center or only utilizing areas on the installation for brief periods during migration.

Objective. Conduct nesting surveys for Least Bell's vireos at the 10 spring areas at least once during the next five years.

8.2.2.1.4 Mohave Ground Squirrel

Surveys were conducted for Mohave ground squirrel in the Goldstone, Bitter Springs, and Langford Lake areas (Recht, 1997). The present status of these populations is unknown. Evaluating the success of specific conservation goals will be difficult without an accurate and up to date census of the populations of the Mohave ground squirrel. It is also important to determine the extent of the Mohave ground squirrel's distribution on the NTC & Fort Irwin to predict its potential effect on the military mission should its status change to one with federal protection in the future.

Goal. Identify all populations of Mohave ground squirrel and Mohave ground squirrel habitat on the NTC and establish a current base line ground squirrel population density for the various management areas.

Objective 1. Continue to conduct small mammal studies aimed at inventory and assessment of species as bio-indicators to determine the distribution of the Mohave ground squirrel on the NTC & Fort Irwin by 2002.

Objective 2. Periodically survey for the Mohave ground squirrel throughout the NTC & Fort Irwin to determine changes in ground squirrel populations in specific areas (Chambers Group, Inc., 1998).

Objective 3. Implement a short-term life history study to determine which parameters determine emergence from hibernation, preferred food sources, and juvenile dispersion from burrows. These studies will be used to determine the standard protocol for monitoring the Mohave ground squirrel.

8.2.2.1.5 California Black Rail

One black rail (State-threatened) was observed at the sewage treatment ponds on the NTC & Fort Irwin during fall 1994 (Brydolf, 1994; 1997), but it has not been seen since. The occurrence of this species at the sewage ponds in the central Mojave Desert is extremely unusual.

Goal. Determine the degree of use of the installation by the California black rail.

Objective. Conduct surveys to determine whether the black rails reported at the sewage treatment plant are occasional or rare winter visitors or constitute a small resident population.

8.2.2.2 Other Management Options

There are no options, without further consultation with the USFWS, for monitoring the federal-listed

species. The option to not monitor these species probably does not exist, particularly for the desert tortoise which is a year-round resident of the NTC & Fort Irwin. There is no legal requirement to monitor the Mohave ground squirrel or to better determine the status of the black rail, so options ranging from no survey or monitoring to greater-than-planned activities are available.

8.3 Water Quality Monitoring

8.3.1 Surface Water

The NTC & Fort Irwin has very limited surface water resources (Section 6.4.1), and with the possible exception of Garlic Springs, there is no reason to suspect that water quality parameters in these waters is other than normal for these types of water bodies. To date there has been no monitoring of springs on the installation. However, Garlic Springs is downstream of the Sewage Treatment Plant, and there is some potential for contamination in this area.

8.3.1.1 Proposed Action

Goal. Ensure compliance with water quality standards.

Objective. Determine the water quality at Garlic Springs during the next five years, and if funding is available, conduct water quality studies at other springs on the installation.

8.3.1.2 Other Management Options

There is no legal requirement to monitor water quality in these springs. Therefore, the option not to monitor exists. There are many options with regard to the number of parameters to be tested and the sensitivity of the testing. At the other extreme is the option to monitor surface water quality of all springs and to monitor all possible parameters at very precise sensitivities.

8.3.2 Groundwater

Groundwater is discussed in sections 4.2 and 6.4.2. Groundwater monitoring and management are not natural resources responsibilities within the Army; and thus not a required part of this INRMP. Groundwater management is within the Compliance Section, Environmental Division, DPW.

A routine groundwater-monitoring program was implemented in April 1989 at the NTC & Fort Irwin. Since then, no groundwater quality contamination from toxic releases by base facilities or activities has been reported. Groundwater monitoring wells were installed at the Training Center's landfill, and a regular schedule of groundwater monitoring has been implemented.

Fuel and oil spills associated with in-field maintenance of support vehicles during military exercises are cleaned up by removing contaminated soils to the designated landfill storage area. Subterranean transport of contaminants is typically inhibited by low annual rainfall and depth of unconsolidated substrate above the groundwater table in recharge zones. Fuel and oil spills should not pose a significant threat to the groundwater.

Hazardous wastes and materials are accumulated, manifested, and transported off the NTC & Fort Irwin.

The facilities where these activities take place are located throughout the Training Center and represent a potential source of groundwater contamination. Monitoring wells have not been installed to assess the magnitude of this concern. Base facilities that store or handle hazardous materials are discussed in detail within the Spill Prevention, Control, and Countermeasure Plan (U.S. Army Corps of Engineers, 1988).

8.4 Soils Inventory and Monitoring

The NTC & Fort Irwin has a complete soils inventory. No additional general soils surveys are required during the next five-year period.

8.4.1 Proposed Action

Goal. Use soil parameters to manage military activities, protect soil stability, rehabilitate training lands, and conserve wildlife habitat.

Objective 1. Use site-specific soil testing for natural resources programs such as training land rehabilitation and erosion control.

Objective 2. Use soil inventory data to make decisions regarding land use, rehabilitation options, and wildlife habitat management options.

Objective 3. Use landform and geomorphic data layers to further refine and improve the applicability of the soil survey data.

8.4.2 Other Management Options

Additional general soil surveys are not a viable option due to the high quality, current soils survey for the installation. Not using data from this inventory is an option, but not one that is prudent in terms of compliance and stewardship.

9.0 NATURAL RESOURCES MANAGEMENT

This chapter includes management practices, which directly affect soil, water, vegetation, and fauna. It includes wildlife habitat management, grounds maintenance, training land management, and direct manipulations of wildlife. Other programs include endangered species management, fire management, special interest area protection, wetlands management, water quality programs, game harvest, and pest management.

9.1 Coordinated Planning

As discussed in Section 1.6, the NTC & Fort Irwin has much in common with other local, state, and federal agencies, municipalities, other military reservations, and other parties interested in the Mojave Desert. Cooperating with other organizations to develop an ecosystem management plan that encompasses the entire Mojave Desert is a significant commitment. In addition, divided responsibilities for various aspects of natural resources management at the NTC & Fort Irwin (Section 5.1) make coordinated intra-installation planning essential to create a fully integrated natural resources program.

9.1.1 Proposed Action

Goal 1. Use coordinated planning to manage natural resources to sustain the military training capability.

Objective. Coordinate natural resources planning with planning for the sustainment of the military mission.

Goal 2. Promote and participate in regional planning for natural resources conservation at scales larger than the NTC & Fort Irwin.

Objective. Continue to coordinate with and support regional planning and programs, such as the Desert Tortoise Recovery Plan, California Desert Conservation Area Plan, West Mojave Coordinated Management Plan, Northern and Eastern Mojave Planning Effort, Mojave Desert Ecosystem Program, and the California Desert Manager's Group.

Goal 3. Use coordinated planning to fully integrate the natural resources program at the NTC & Fort Irwin.

Objective 1. Update the INRMP at least every five years or when major changes are made to the natural resources program. (This will require the next INRMP update to begin in 2005.)

Objective 2. Bi-annually update the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a), which has the following goals and objectives:

ITAM Goals

- Monitoring land condition.
- Integrating training requirements with land capacity.
- Providing for land rehabilitation and maintenance.
- Educating land users to minimize impacts.

- Preserving natural and cultural resources.

ITAM Objectives

- Sustain training lands to ensure their availability to support training indefinitely.
- Plan, program, and execute both repair and maintenance projects and reconfigure and redesign training areas to support sustainment of the land.
- Monitor resource conditions and determine trends in those conditions.
- Educate land users to prevent avoidable damage to the land and minimize unavoidable damage resulting from training and other mission activities.

9.1.2 Other Management Options

There is no reason not to coordinate the NTC & Fort Irwin natural resources program with other regional initiatives, and the installation is encouraged to do so via Army regulations and policies, as well as ecosystem management strategies. However, such coordination is not required, so it could be done at a lesser intensity or not at all. Since the installation participates in all appropriate regional planning efforts, a greater degree of coordination is not viable.

There is no reason not to internally integrate the NTC & Fort Irwin natural resources program, and the installation is encouraged to do so via Army regulations and policies, as well as ecosystem management strategies. The installation is legally mandated to update this INRMP at least every five years, and it is also mandated by Army policies to update its ITAM plan annually. Thus, no viable alternatives exist for meeting Goal 2.

9.2 Forest Management

The NTC & Fort Irwin has very limited forest resources. NTC & Fort Irwin forest resources will be managed as part of programs described for the installation as a whole, rather than via a special forest management plan.

9.3 Agricultural Outleases

The NTC & Fort Irwin has no agricultural outleases. There are no plans to institute such leases since they are not compatible with the military mission or ecosystem management strategies.

9.4 Habitat Management

Habitat management is accomplished through focused wildlife habitat management projects, training land rehabilitation, wetlands management, fire protection, erosion control, and similar programs. The following sections describe the focused wildlife habitat programs and projects. All other activities are described in their corresponding sections of the INRMP.

The purpose of habitat management is to enhance natural resources on which wildlife depends. This means increasing access to or amounts of food, cover, and water for desirable species while considering training

requirements. It also entails limiting access to these resources for pest species (e.g. coyotes, burros, ravens). Habitat management is generally the responsibility of the DPW Natural Resources staff. When activities can also be considered training area improvements, as in the case of revegetation projects, the ITAM Office is the responsible entity.

9.4.1 Habitat Management Strategy and Goals

Strategy: Apply scientific knowledge and principles to manage and enhance wildlife resources as a direct reflection of habitat quality and quantity.

General Goal 1. Utilize ecological functions and landscape level planning to alter limiting factors and promote priority endemic species.

General Goal 2. Base species management priorities on conservation needs as defined by global, regional, and local abundance; distribution and threats; population trends; importance of areas to species; potential for population and/or habitat management; and human interests.

9.4.2 Wildlife Habitat Projects

Below habitat management practices on the NTC & Fort Irwin are categorized as a means to discuss them. However, there is overlap within these sections as well as with other sections of this INRMP.

9.4.2.1 Seeps and Springs

Seeps and springs that occur on the Training Center support the most diverse assemblage of both plants and animals that occur on the installation. In addition to providing water for species that inhabit the NTC & Fort Irwin, they are invaluable for numerous migrating bird species that use these areas as stopover points during migrations. Springs are important for some federal- and/or State-listed threatened or endangered species. Some springs meet the criteria to be protected by the U. S. Army Corps of Engineers as wetlands.

Many desert species are dependent on natural springs and guzzlers for habitat requirements (red spotted toad, mosquito fish, bats, and aquatic insects), and these sites are the primary water sources for most larger wildlife species. Management of these critical areas is a priority. Most known springs and guzzlers were mapped and photographed in FY 97. The protection afforded springs is described in Section 9.12.1.2.

Saltcedar (tamarisk) is the highest priority for removal of invasive, non-native plants, in accordance with Executive Order 13112, *Invasive Species*. In 1996 the BLM assisted the Training Center with saltcedar removal at Bitter Springs, but some regrowth is occurring. Triclopyr® herbicide is particularly effective on this species. Recent efforts in concert with BLM, volunteer groups, and others has greatly reduced the presence of saltcedar, both on and off-post. However, the need still exists for tamarisk control along the length of the Bitter Spring wash system. It is believed that its presence can be controlled, if not eliminated, by the year 2003.

The NTC & Fort Irwin recently evaluated (U.S. Army, National Training Center and Fort Irwin, 1997b) its springs. Several general comments were made in the report:

- Burro use was evident at Leach Springs, Two Springs, and Desert King Springs.

- All springs require monitoring, and continuing the off-limits status is required to retain functional springs.
- All require assessment of historical significance before work can be done.
- Off-limits markings, fences, etc should be checked after each rotation.

The following condition summaries were made in the report:

No Name Spring - Damaged and not functional.

Desert King Spring - Partially functioning; fence down.

Two Springs - Open water accessible to wildlife; fence needs repair; development potential.

Garlic Spring - Fence intact; basins dry; vegetation encroachment.

Bitter Spring - Tamarix removal ongoing and surface water re-appearing.

Drinkwater Spring - All components destroyed by personnel and ordnance.

Devouge Spring - Non-functioning; fence intact.

Arrastre Spring - All components destroyed; surface water not apparent.

Jack Spring - Functional with intact fence and open water.

The report does not include Cave Spring, Hellwind Canyon, or Leach Spring. Recommendations are made for each spring evaluated. The report also includes a water development that was intact, but dry. It appears that this development could be restored.

9.4.2.1.1 Proposed Action

Goal. Maintain springs and seeps as essential components of the desert ecosystem.

Objective 1. Construct fences designed to exclude wild burros but allow access to desert bighorn sheep at springs in the Avawatz Mountains.

Objective 2. Actively remove invasive, non-native plant species from the vicinity of the springs. Section 9.10.1.2 further describes accomplishment of this objective.

Objective 3. Renovate and maintain Jack Spring (NK 220898), approximately 100 yards (91 m) south of the installation's southern border, and its associated wetlands in coordination with the BLM.

Objective 4. Implement repair recommendations in the 1997 spring evaluation report (U.S. Army, National Training Center and Fort Irwin, 1997b).

9.4.2.1.2 Other Management Options

There is no direct legal requirement to maintain or protect these springs. Thus, the installation could elect to do less, or even no protection of them in most cases. However, springs are important habitat to at least two federal-listed birds, and options, which could degrade their quality,⁹ must take this into account. The installation could elect to allow burros to continue to use the springs, but this would be counter to its goal of zero burros (see Section 9.10.1.1).

There is a new (1999) Executive Order 13112 requirement to identify, remove, and monitor invasive, non-

native species. Thus, the removal of invasive species from spring areas is not optional provided it is done within budgetary limitations.

There is no requirement to assume responsibility for the maintenance of Jack Spring. The spring could be maintained to an unknown degree by the BLM. Due to the spring's location, this would be more difficult for BLM than for the NTC & Fort Irwin.

9.4.2.2 Wildlife Guzzlers

Guzzlers provide a permanent water resource that helps improve the value of the surrounding habitat for several wildlife species, including upland game species, such as chukars, Gambel's quail, and rabbits, and larger mammal species, such as coyotes and bobcats. The previous Natural Resources Management Plan (RMS Corp., 1982) recommended that five wildlife guzzlers be placed in predetermined locations on the NTC & Fort Irwin to collect and provide additional water sources for native wildlife. The CDFG installed guzzlers but exact locations were not communicated to the Natural Resources staff on the NTC. As such, the condition of the guzzlers is unknown at this time, with exception of one at Drinkwater Lake and one near Cave Spring (U.S. Army, National Training Center and Fort Irwin, 1997b). The guzzler at Drinkwater Lake is intact and operational with only slight repairs needed. The guzzler near Cave Spring is nonfunctional and may need replacement.

Guzzler locations should complement, rather than supplement, water available at springs. Remote locations in mountainous areas, where training activities are minimal and wary wildlife species such as the Nelson's bighorn sheep can be found, are ideal.

9.4.2.2.1 Proposed Action

Goal. Provide artificial water sources for wildlife.

Objective 1. Locate all guzzlers and assess their condition.

Objective 2. Maintain or replace wildlife guzzlers in coordination with the CDFG.

Objective 3. Construct fences designed to exclude wild burros but allow access to desert bighorn sheep at guzzlers in the Avawatz Mountains.

Objective 4. Evaluate additional locations for guzzlers, particularly remote mountainous areas.

9.4.2.2.2 Other Management Options

There is no legal requirement to maintain or protect these guzzlers. There are some "purist" strategies that would preclude the use of artificial watering devices in the desert. Thus, the installation could elect to do less, or even no, protection of them. The installation could work with the CDFG to remove them. The installation also could elect to allow burros to continue to use the guzzlers, but this would be counter to its goal of zero burros (see Section 9.10.1.1).

9.4.2.3 Endangered Species Habitat Projects

Since endangered species habitat projects are highly individual species-oriented, they are discussed in Section 9.5.2. This also allows for a more cohesive understanding of management programs designed for these species.

9.5 Fish and Wildlife Population Management

General Goal. Maintain wildlife populations at optimal levels in accordance with species priorities, population ecology, population health considerations, and habitat capacities.

9.5.1 Game Management

Game populations are not specifically managed on the NTC & Fort Irwin. Hunting pressure and success are such that the sport has no known significant impact on populations of game species. Hunting is more viewed as using small portions of game resources rather than managing game populations. Chapter 12 describes procedures to manage hunting.

9.5.1.1 Proposed Action

Goal. Maintain game species to produce harvestable surpluses on a sustained basis.

Objective 1. Survey huntable populations of game species prior to each hunting season and use information to establish hunting seasons.

Objective 2. Continue to provide hunting opportunities within CDFG regulations and requirements of the military mission at the NTC & Fort Irwin.

9.5.1.2 Other Management Options

While there is no legal mandate to provide hunting, the Sikes Act requires that outdoor recreation be part of this INRMP. Both the committee language for the 1997 amendments to this Act and Army regulations (AR 200-3) require the installation to evaluate the use of hunting within the constraints of the military mission and consistent with protection of natural resources and maintenance of quality hunting conditions. The game management program at the NTC & Fort Irwin is limited but consistent with laws and regulations. The option to reduce or eliminate game management is available, particularly if the needs of the military mission become more exclusive. The option to increase game management is available, but not consistent with the requirements of the military mission or demand for hunting.

9.5.2 Endangered, Threatened, and Other Species of Special Concern

This section includes population and habitat management of endangered, threatened, and other species of special concern, unless they have been discussed elsewhere. AR 200-3 states (Section 11-2(a-e)) that the Army has five primary requirements under the Endangered Species Act:

- to conserve listed species,

- not to "jeopardize" listed species,
- to "consult" and "confer",
- to conduct a biological assessment, and
- not to "take" listed fish and wildlife species or to remove or destroy listed plant species.

The NTC & Fort Irwin is committed to these five primary requirements.

The nature of the NTC & Fort Irwin military mission, using tightly controlled scenarios with the latest technology, provides a means to help protect sensitive species on the Training Center. Observer/ Control Teams are assigned to each command element of rotational units to find and reorient units unfamiliar with the Training Center and serve as mentors or coaches during actual training exercises. This process helps prevent unnecessary habitat destruction by keeping rotational units out of areas where they are not supposed to train.

Rotational units are strictly controlled by using a global positioning system to display their location within 33 feet. The complete instrument package for maneuver unit vehicles and personnel enables visual contact with units via remote video cameras, and the Multiple Integrated Laser Engagement System (MILES) system gives Observer/Control Team personnel the ability to artificially "kill" training personnel and their vehicles (*i.e.*, disqualify them from further training for that mission) if they are found near controlled or off-limits areas (Chambers Group, Inc., 1998).

9.5.2.1 Status of Sensitive Species

Sections 6.6.3 and 6.7.6 discuss the status of species that are federal and state endangered, threatened, or Species of Special Concern at the NTC & Fort Irwin. Sections 8.1.3, 8.2.1, and 8.2.2 describe monitoring programs for these species on the Training Center.

General Goal. At a minimum, maintain sensitive species populations (or migratory use) and their habitats at current levels with the long-term goal of increasing species numbers and the size and distribution of quality habitats.

9.5.2.2 Desert Tortoise

Monitoring programs for the desert tortoise are described in Section 8.2.2.1.1. A programmatic management plan (Chambers Group, 1996a) for the desert tortoise was prepared to guide the management of the desert tortoise at the NTC & Fort Irwin. Below management programs for the desert tortoise are summarized from the draft ESMP (Chambers Group, Inc., 1998), which incorporates information within the programmatic management plan.

As more fully described in the ESMP, the NTC & Fort Irwin has adopted a series of programs to benefit the desert tortoise. Each program undertaken on behalf of the desert tortoise at the Training Center contributes to a better understanding and the conservation and preservation of the species as a whole. These programs include education programs for military and civilian personnel (Section 11.1), juvenile tortoise research, surveys for the tortoise (Section 8.2.2.1.1), and long-term studies that include desert tortoise monitoring plots, tortoise relocation, upper respiratory tract disease, neonatal information, and desert tortoise predation.

The Chief Environmental Scientist for the Secretary of the Army is developing a proposal to prepare a desert tortoise management plan with long-term demographic and physiology studies as partial mitigation for the proposed land expansion. As this plan is completed and implemented, it will be included in this INRMP by reference.

Critical Habitat

On February 8, 1994 the USFWS published a final rule in the Federal Register (CFR 5820) designating 6.4 million acres of critical habitat for the Mojave population of the desert tortoise (*Gopherus agassizii*). Prior to critical habitat designation, the NTC & Fort Irwin installed a barrier fence to limit training south of the 90 UTM line. Since the Army had restricted training south of this line, it is used as the northernmost edge of the Superior/Cronese Desert Wildlife Management Area (DWMA) on Fort Irwin.

Designated critical habitat on the NTC & Fort Irwin either has a high potential for tortoises to occur or sufficient data based on previous surveys indicate that the species occurs throughout the area (Chambers Group, Inc., 1994; Krzysik and Woodman, 1991; Woodman and Goodlett, 1990). Training is typically restricted from these areas, with exception of some restricted convoy or tank routes or limited firing ranges. Vegetation in these areas is in better condition with some vegetation damage where training activities previously took place. Due to the relatively undisturbed nature of this desert tortoise habitat compared to other areas within the NTC & Fort Irwin and due to the Training Center's protection of this area for the desert tortoise, critical habitat requires the highest consideration. Critical habitat includes the Southern Boundary area and the southern portion of the Goldstone Complex (see Figure 2.2).

The Southern Boundary (the area surrounding the Alvord Mountain Range), south of the 3,890,000 meters North Universal Transverse Mercator line (90 UTM grid line), is the focus of NTC & Fort Irwin tortoise management efforts. This area contains the highest known densities of desert tortoises on the Training Center. Prior to critical habitat designation, installation policy limited training unit access to this area to protect tortoises. This area is off-limits to any military training except on Manix tank trail, which is used as a convoy route from the train depot at Yermo to the Training Center. When Fort Irwin highway south of Jack Hammer Pass was widened, the Army paid for a tortoise-proof fence along both sides of the highway as mitigation.

Although Goldstone is off-limits to Army training activities, the Goldstone tank trail that runs along the entire length of the Goldstone Complex allows tactical vehicles to enter the training ranges near Nelson Lake from the southeast. Bivouac activity by military units is also allowed at/near Pioneer. This area supports a limited population of desert tortoises.

Designated Relocation/Refuge Areas

In November 1995 the Natural and Cultural Resources Section, DPW conducted informal consultation with the USFWS regarding areas that may serve as refugia (M. Quillman, personal communication, 1995 in Chambers Group, Inc., 1998). These areas were chosen as safe zones for the desert tortoise. Although tortoise habitats in these areas may not be of truly high quality, they function as "pockets" or "islands" of habitat for relocated tortoises that wander into areas where active training occurs. These refugia are located 1.25 miles (2.0 km) along the southeastern foothills of Tiefert Mountain and Eastgate areas along the eastern installation boundary.

Restricting Access

Units are restricted from entering other areas designated as off-limits (e.g., springs and archaeological sites). Many of these areas are fenced, but some intrusion occurs. In other areas, tracked vehicular access is limited by terrain where slopes exceed 20 percent; generally, vehicular traffic is not common in these areas due to the difficulty of the terrain. Highly visible Seibert stakes have been designed to clearly mark roadways and restricted areas to restrict vehicular travel to marked roads.

Each rotational unit is escorted by two military police officers who have been trained in handling desert tortoises and are assigned to stay with the unit during its stay on post. Military police officers are posted in the convoy's lead position as it travels along Manix tank trail. One lead observer's role is to reduce the level of impact to desert tortoises by removing the animals from harm's way where and when it is reasonable and practicable. Lead observers are trained by Natural and Cultural Resources Section personnel on correct desert tortoise sighting and handling protocol. Handling protocols include moving a tortoise several yards off a road.

The post veterinary clinic typically cares for four to six desert tortoises each year. These are usually sick or injured tortoises that cannot be returned to the wild. The Natural and Cultural Resources Section provides a desert tortoise adoption service.

Predation Control

Common raven populations have been increasing in the Mojave Desert. Data from the USFWS Breeding Bird Survey program covering 1968 to 1992 shows a tenfold increase in raven numbers in the Mojave Desert (Boarman and Berry, 1994). Conditions at the NTC & Fort Irwin are conducive to increasing the number of ravens in the area by providing increased road kills, permanent water supplies, supplementary food at the landfill, and permanent structures for raven nesting and roosting sites. Because ravens are known to prey on juvenile desert tortoises, increases in raven populations could have negative impacts on desert tortoise populations on the Training Center.

Coyotes are also known predators of desert tortoises. Much of the above discussion pertains to coyotes as well as ravens.

As part of NTC & Fort Irwin continuing efforts to protect and manage desert tortoise populations, a common raven management study has recently been conducted (Chambers Group, Inc., 1996b). Additional studies on the ecology and natural history of ravens in the desert are being conducted by the Biological Resources Division, USGS using wing-tagged ravens for year-round raven counts and radio-tracking to assess the status and trends of raven populations and their potential impacts to desert tortoise populations on the Training Center.

9.5.2.2.1 Proposed Action

Goal 1. Establish/maintain off-limits critical desert tortoise habitat areas that have the best quality habitat and highest known tortoise populations, are the most sensitive to disturbance and, consequently, are most sensitive to substantial loss of tortoise and/or tortoise habitat.

Objective 1. Maintain the off-limits status of desert tortoise critical habitat.

Objective 2. Maintain the two-strand barbed wire fence along the 90 UTM grid line (until USFWS permits us to return the area south of the UTM 90 grid line to training) and Manix tank trail to prevent vehicles from accidentally straying into the area.

Objective 3. Use Seibert stakes approximately every 30 meters along the 90 UTM grid line as an additional boundary marker and along both sides of Manix and Goldstone tank trails to further prevent traffic from widening or straying off trails.

Objective 4. Revegetate old tank trails that are no longer in use through the Southern Boundary area (see Section 9.8.1.1).

Objective 5. Use Range Control officials, following each rotation, to survey training area impacts and perform maintenance duties, such as repairing downed fences in off-limits areas and standardize and formalize the reporting system so repairs are made promptly.

Goal 2. Reduce injury and mortality of desert tortoises.

Objective 1. Consider establishing refugia for relocation at the following locations:

- the Two Springs area just south of Leach Lake,
- undisturbed areas of the Goldstone Complex (with Goldstone permission), and
- critical habitat along the southern boundary (south of the 90 UTM grid line), but only after it has been established that translocated tortoises are disease free.

Objective 2. Reduce take of desert tortoises due to straying of vehicles from approved routes of travel through establishment of clearly marked roadways and tank convoy routes.

Objective 3. Mark all off-limits management areas and relocation areas to identify them as desert tortoise habitat and management areas.

Objective 4. Post Manix and Goldstone tank trails with 20 mph speed limit signs.

Objective 5. Use Observer/Control Teams and Military Police lead observers to minimize harm to desert tortoises and damage to their habitats.

Goal 3. Effectively translocate tortoises.

Objective 1. Design a specific desert tortoise handling protocol based on the Desert Tortoise Council's 1994 Guidelines for handling desert tortoises.

Objective 2. Use only trained and authorized biologists participating in the desert tortoise translocation study to relocate tortoises, using specific handling and marking/tagging protocols, and only to relocation areas designated by the USFWS.

Objective 3. Use the post veterinary clinic to care for sick or injured desert tortoises, and provide a desert

tortoise adoption service in conjunction with the Natural and Cultural Resources Section for tortoises that cannot be returned to the wild.

Goal 4. Establish/maintain education and training programs and well-defined operational procedures to avoid injury or mortality of desert tortoises during training and other activities.

Sections 11.1 and 11.2 describe programs to educate persons who use the NTC & Fort Irwin on requirements to protect desert tortoises and their habitat.

Goal 5. Enlist support of the Commanding General and other senior officers in emphasizing the importance of compliance with operational procedures.

Goal 6. Reduce mortality of tortoises due to predation.

Section 9.10.1.1 includes measures to reduce predation losses to desert tortoises.

Goal 7. Develop and implement a long-term desert tortoise management plan.

Objective 1. Support Department of Army efforts to develop a long-term management plan for the desert tortoise at the NTC & Fort Irwin.

Objective 2. When completed and approved, implement the desert tortoise management plan and ensure its provisions are incorporated into the Endangered Species Management Plan.

9.5.2.2.2 Other Management Options

There are no options with regard to managing the desert tortoise within requirements of the Endangered Species Act, as established in the Biological Opinion (USFWS, 1995). When the draft ESMP is finalized, it will be the NTC & Fort Irwin's plan for achieving compliance, and modifications would require consultation with the USFWS. Thus, there are few options with regard to management of the desert tortoise and its habitat without considerable consultation and coordination.

9.5.2.3 Willow/Southwestern Willow Flycatcher

Monitoring programs for the willow/southwestern willow flycatcher are described in Section 8.2.2.1.2. Below management programs for the willow/southwestern willow flycatcher are summarized from the draft ESMP (Chambers Group, Inc., 1998).

The 10 springs designated as off-limits areas within the NTC & Fort Irwin (Jack Springs¹⁰, Garlic Springs, Bitter Springs, Leach Springs, Desert King Springs, Two Springs, Drinkwater Springs, Devouge Springs, Cave Springs, and one unnamed spring) have a high potential for southwestern willow flycatchers to occur (USFWS, 1994; Brydolf, 1996). Vegetation in these spring areas is almost entirely intact. Due to the undisturbed nature of southwestern willow flycatcher habitat compared to other areas within the NTC & Fort Irwin and due to the Training Center commitment to protect this area, these most suitable habitat areas

¹⁰ Jack Springs is just south of the Training Center.

require the highest consideration. Because the southwestern willow flycatcher inhabits willow thickets and riparian areas, only spring areas are designated as suitable habitat for this species.

All desert spring areas are designated as off-limits; therefore, all units are restricted from entering any spring area. These areas are fenced along each spring's margin and have Seibert stakes to clearly identify the area as off-limits. Wildlife species that utilize these springs as a water source have relatively free access to the water source.

9.5.2.3.1 Proposed Action

Goal 1. Establish and maintain off-limits crucial willow/southwestern willow flycatcher habitat areas that have the best quality habitat, highest potential for use, highest known flycatcher populations or use, and are the most sensitive to disturbance.

Objective 1. Clearly mark off-limit areas, including all spring locations.

Objective 2. Use Range Control officials, following each rotation, to survey training area impacts and perform maintenance duties, such as repairing downed fences in off-limit areas.

Objective 3. Clear all spring and associated riparian locations of invasive, non-native vegetation (see Section 9.10.1.2).

Objective 4. Remove evidence of recent human occupation and use.

Objective 5. Restore and revegetate spring areas with native species.

Goal 2. Reduce take of willow/southwestern willow flycatchers.

Objective 1. Mark all off-limits springs to identify them as endangered species management areas.

Objective 2. Use Observer/Control Teams and Military Police lead observers to minimize damage to willow/southwestern willow flycatcher habitat.

9.5.2.3.2 Other Management Options

There are no options with regard to managing the southwestern willow flycatcher within the requirements of the Endangered Species Act. When the draft ESMP is finalized, it will be the NTC & Fort Irwin's plan for achieving compliance, and modifications would require consultation with the USFWS. Thus, there are few options with regard to management of the southwestern willow flycatcher and its habitat without considerable consultation and coordination.

There are no requirements to specifically manage for the willow flycatcher on the NTC & Fort Irwin. However, since it uses the same habitat as the southwestern willow flycatcher and there are difficulties in visually discerning between the two species, management for the willow flycatcher occurs as a byproduct of management for the federal-listed southwestern subspecies.

9.5.2.4 Least Bell's Vireo

Monitoring programs for the Least Bell's vireo are described in Section 8.2.2.1.3. Below management programs for the Least Bell's vireo are summarized from the draft ESMP (Chambers Group, Inc., 1998). The below section is virtually identical to programs described for the willow/southwestern willow flycatcher in Section 9.5.2.3.

The 10 springs designated as off-limits areas within the NTC & Fort Irwin (Jack Springs, Garlic Springs, Bitter Springs, Leach Springs, Desert King Springs, Two Springs, Drinkwater Springs, Devouge Springs, Cave Springs, and one unnamed spring) have a high potential for least Bell's vireos to occur (USFWS, 1994; Brydolf, 1996). Vegetation in these spring areas is almost entirely intact. However, invasive plant species may prohibit least Bell's vireo habitat. A large tamarisk removal and revegetation project is needed in these areas. Due to the undisturbed nature of least Bell's vireo habitat compared to other areas within the NTC & Fort Irwin and due to the Training Center commitment to protect this area, these most suitable habitat areas require the highest consideration. Because the least Bell's vireo inhabits willow thickets and riparian areas, only spring areas are designated as suitable habitat for this species.

All desert spring areas are designated as off-limits; therefore, all units are restricted from entering any spring area. These areas are fenced along each spring's margin and have Seibert stakes to clearly identify the area as off-limits. Wildlife species that utilize these springs as a water source have relatively free access to the water source.

9.5.2.4.1 Proposed Action

Goal 1. Establish and maintain off-limits crucial Least Bell's vireo habitat areas that have the best quality habitat, highest potential for use, highest known vireo populations or use, and are the most sensitive to disturbance.

Objective 1. Clearly mark off-limit areas, including all spring locations.

Objective 2. Use Range Control officials, following each rotation, to survey training area impacts and perform maintenance duties, such as repairing downed fences in off-limit areas.

Objective 3. Clear all spring and associated riparian locations of invasive, non-native vegetation (see Section 9.10.1.2).

Objective 4. Remove evidence of recent human occupation and use.

Objective 5. Restore and revegetate spring areas with native species.

Goal 2. Reduce take of Least Bell's vireos.

Objective 1. Mark all off-limits springs to identify them as endangered species management areas.

Objective 2. Use Observer/Control Teams and Military Police lead observers to minimize damage to Least

Bell's vireo habitat.

9.5.2.4.2 Other Management Options

There are no options with regard to managing the Least Bell's vireo within the requirements of the Endangered Species Act. When the draft ESMP is finalized, it will be the NTC & Fort Irwin's plan for achieving compliance, and modifications would require consultation with the USFWS. Thus, there are few options with regard to management of the Least Bell's vireo and its habitat without considerable consultation and coordination.

9.5.2.5 Lane Mountain Milkvetch

Monitoring programs for the Lane Mountain Milkvetch are described in Section 8.1.3.1. The draft ESMP (Chambers Group, Inc., 1998) will be amended to add this species.

Known Lane Mountain Milkvetch areas are off-limits to military activities on the NTC & Fort Irwin. The main site is a 9-square kilometer (2,223 acres) area near the southwestern corner of the installation (just south of Goldstone), three square kilometers (741 acres) of which are on the installation with the remainder on BLM lands. Two populations are known from the Goldstone area. The Lane Mountain, Goldstone, and the contiguous BLM-NTC areas include the entire known existing and historic range of the species (Chambers Group, Inc., 1994).

9.5.2.5.1 Proposed Action

Goal 1. Establish and maintain off-limits Lane Mountain Milkvetch habitat.

Objective 1. Clearly mark off-limit areas.

Objective 2. Use Range Control officials, following each rotation, to survey training area impacts and perform maintenance duties, such as repairing downed fences in off-limit areas.

Goal 2. Minimize take of Lane Mountain Milkvetch.

Objective 1. Mark all Lane Mountain Milkvetch off-limits areas to identify them as endangered species management areas.

Objective 2. Use Observer/Control Teams and Military Police lead observers to minimize damage to Lane Mountain Milkvetch habitat.

9.5.2.5.2 Other Management Options

There are no options with regard to managing the Lane Mountain Milkvetch within the requirements of the Endangered Species Act. When the draft ESMP is finalized, it will be the NTC & Fort Irwin's plan for achieving compliance, and modifications would require consultation with the USFWS. Thus, there are few options with regard to management of the Lane Mountain Milkvetch and its habitat without considerable consultation and coordination.

9.5.2.6 State-protected Species

General Goal. Consider State-protected species in all Army actions, per Army Regulation 200-2.

9.5.2.6.1 Proposed Action

Mohave Ground Squirrel

The NTC & Fort Irwin is on the southeastern edge of the range of the Mohave ground squirrel. Section 8.2.2.1.4 described inventory and monitoring projects for the Mohave ground squirrel, a state-listed threatened species. Krzysik (1991) conducted the most recent installation-wide assessment of the species' status. However, many data presented in that report were taken from reports prepared in the late 1970s and early 1980s. More recent studies incidentally report occurrences of the ground squirrel on the Training Center but are part of a more complex study that is not intended to provide information on Mohave ground squirrel status and distribution. The NTC & Fort Irwin is not specifically managing the Mohave ground squirrel, although protection for other species and areas provide considerable protection for the ground squirrel.

The draft ESMP (Chambers Group, Inc., 1998) includes the Mohave ground squirrel. Including this species in this plan is a commitment on the part of the NTC & Fort Irwin to reducing the likelihood of federal protective listing in the future. Below projects described for this species are taken from this draft plan.

Goal 1. Use measures established for federal-listed species to provide protection for the Mohave ground squirrel.

Objective. Implement measures to protect critical and crucial habitat and reduce take for the desert tortoise, willow/southwestern willow flycatcher, Least Bell's vireo, and Lane Mountain Milkvetch (sections 9.5.2.2, 9.5.2.3, 9.5.2.4, and 9.5.2.5, respectively). Since these habitats are also valuable habitat for the Mohave ground squirrel and the take minimization measures will also benefit the ground squirrel.

Goal 2. Establish additional refugia for the Mohave Ground Squirrel

Objective. Record all Mohave ground squirrel observations on the NTC & Fort Irwin and establish data as a GIS layer.

Alkali Mariposa Lily

Since the alkali mariposa lily has not been confirmed on the NTC & Fort Irwin, the development of specific protective and management objectives will be dependent upon results of surveys for this species (Section 8.1.3.1). The alkali mariposa lily typically occurs in alkaline meadows and moist creosote brush scrub plant communities. Thus, measures to protect listed species, particularly spring areas, will protect potential habitat for this species of concern. The following measures from the draft ESMP (Chambers Group, Inc., 1998) will provide protection for potential habitat:

Goal. Use measures established for federal-listed species to provide protection for possible habitat for the alkali mariposa lily.

Objective. Implement measures to protect crucial habitat for the willow/ southwestern willow flycatcher and Least Bell's vireo (sections 9.5.2.3 and 9.5.2.4) since these habitats may be occupied by the alkali mariposa lily.

Mohave Monkey flower

Since the Mohave monkey flower has not been confirmed on the NTC & Fort Irwin, the development of specific protective and management objectives will be dependent upon results of surveys for this species (Section 8.1.3.1). Suitable Mohave monkey flower habitat is located in the badland areas of mountain ranges which is not used for military maneuvers due to steep inclines over 20%. Measures to protect other sensitive species and the non-use of steep areas for military maneuver will protect potential habitat for this species of concern. The following measures from the draft ESMP (Chambers Group, Inc., 1998) will provide protection for potential habitat:

Goal. Use measures established for other sensitive species to provide protection for possible habitat for the Mohave monkey flower.

Objective 1. Implement measures to protect critical and crucial habitat for the desert tortoise and Lane Mountain Milkvetch (sections 9.5.2.2 and 9.5.2.5, respectively) since these habitats may be occupied by the Mohave monkey flower.

Objective 2. Minimize maneuver training in areas with slopes greater than 20%.

9.5.2.6.2 Other Management Options

The NTC & Fort Irwin is not legally required to specifically manage State-listed species. Thus, even though Army regulations require consideration for these species, the above programs specifically for three State-listed species are not required to be implemented. However, with exception of the possible establishment of additional refugia for the Mohave ground squirrel, projects described for these species are also required for federal-listed species. Thus, as described in discussions of Other Management Options for the federal-listed species, options are only available after consultation with the USFWS.

There is no requirement for additional refugia for the Mohave ground squirrel. The same is true of not using steep slopes for military activities. Thus, the installation has the option to drop these projects or to reduce their scope to any degree. These options would, however, reduce the degree of protection afforded this species and increase the potential for future federal listing.

9.5.3 Furbearer/Predator Management

Trapping is not permitted on the NTC & Fort Irwin. Section 9.10.1.1 describes programs to reduce desert tortoise predation by coyotes and ravens.

9.5.4 Other Species Management

Most species management on the NTC & Fort Irwin is directed towards listed species, primarily due to their compliance requirements. However, these compliance-featured species comprise a very small part of the installation biodiversity. Fortunately, measures for listed species also benefit many other species of wildlife

on the installation.

Special interest area habitat protection measures (Section 9.12), wildlife habitat programs (Section 9.4), wetlands management (Section 9.6), water quality management (Section 9.7), LRAM (Section 9.8), wildfire protection (Section 9.11), Training Requirements Integration (Section 9.13), and effective environmental awareness programs (Chapter 11) will benefit non-game species in general, consistent with ecosystem management strategies.

9.5.4.1 Birds

Inventory and monitoring projects for birds are described in Section 8.2.1.1.2. Protection and management for the willow/southwestern willow flycatcher (Section 9.5.2.3) and Least Bell's vireo (Section 9.5.2.4), in particular, are extremely important to the management and protection of most avian species that use the NTC & Fort Irwin (Chambers Group, Inc., 1998).

9.5.4.1.1 Proposed Action

Goal. Use measures established for federal-listed species to provide protection for birds that use the NTC & Fort Irwin.

Objective. Implement measures to protect critical and crucial habitat and minimize take for the desert tortoise, willow/southwestern willow flycatcher, Least Bell's vireo, and Lane Mountain Milkvetch (sections 9.5.2.2, 9.5.2.3, 9.5.2.4, and 9.5.2.5, respectively). These habitats are also valuable habitat for birds in general, and the take minimization measures will also benefit many bird species.

9.5.4.1.2 Other Management Options

The NTC & Fort Irwin is not legally required to specifically manage nonfederal-listed species. Thus, above programs for birds in general are not required to be implemented. However, projects described for these species are also required for federal-listed species. Thus, as described in discussions of Other Management Options for federal-listed species, options are only available after consultation with the USFWS.

9.5.4.2 Bats

Inventory and monitoring projects for bats are described in Section 8.2.1.1.1. Protection and management for the willow/southwestern willow flycatcher (Section 9.5.2.3) and Least Bell's vireo (Section 9.5.2.4), in particular, are important to the management and protection of many bat species that use the NTC & Fort Irwin (Chambers Group, Inc., 1998).

Springs provide excellent habitat for foraging bats. Removal of dense vegetation from springs permits better access to bats dipping for water. The installation of gates on mines would have a dual benefit of protecting bat habitat and reducing hazards to human safety.

9.5.4.2.1 Proposed Action

Goal 1. Use measures established for federal-listed species to provide protection for bats that use the NTC & Fort Irwin.

Objective 1. Implement measures to protect and maintain crucial habitat for the willow/southwestern willow flycatcher and Least Bell's vireo (sections 9.5.2.3 and 9.5.2.4) since spring habitats are also valuable foraging habitat for bats.

Objective 2. Emphasize Drinkwater, Bitter, Desert King and Garlic springs (needing significant renovation) with regard to protecting bat foraging sites (Brown, 1994).

Goal 2. Identify and protect bat roosting and maternity sites.

Objective 1. Establish/maintain off-limits bat habitat areas that have the highest known populations and best quality habitat for bats.

Objective 2. Install bat gates that are specific to suspected species at mine openings, using recommendations from Brown (1994), to prevent human activity in mines, which can have a detrimental affect on bat populations on the NTC & Fort Irwin.

Objective 3. Continue to minimize training in areas with greater than 20% slopes to protect cliff faces that are roosting sites for bats.

9.5.4.2.2 Other Management Options

The NTC & Fort Irwin is not legally required to specifically manage nonfederal-listed species. Thus, above programs for bats are not required to be implemented. However, projects described for these species, with exception of protection for bat roosting and nesting habitats, are also required for federal-listed species. Thus, as described in discussions of Other Management Options for federal-listed species, options are only available after consultation with the USFWS.

There is no requirement to protect bat roosting or nesting habitat. Thus, these programs can be reduced or eliminated. However, since bats, in general, are species of concern at the State-level, actions to improve their habitats and minimize threats to their numbers will reduce the potential for future federal listing.

9.6 Wetlands Management

Wetlands protection is required by Executive Order 11990, *Protection of Wetlands*. Wetlands at the NTC & Fort Irwin are confined to ten springs, and although the total wetland acreage is extremely small, these areas are essential to the survival and well being of many wildlife species. Protection and maintenance of existing habitat are the primary thrust of wetlands management on the NTC & Fort Irwin.

Environmental review and regular inspection are the primary means of detecting threats to wetlands on the Training Center. The Natural and Cultural Resources Section reviews actions which may affect wetlands. Reviews come from several sources: engineer work orders, service orders, military training plans, NEPA documentation, major construction plans, etc. If necessary, projects with potential impacts would be referred to the Corps of Engineers (Los Angeles District) to determine if jurisdictional wetlands are implicated, establish mitigation procedures, and/or obtain permits. Wetland-affecting projects require NEPA documentation (Chapter 14). Both Natural Resources and ITAM personnel regularly visit many springs.

These inspections are used to determine threats to spring wetlands and re-establish off-limits marking and fencing if necessary.

Activities in wetlands which require federal permits include, but are not limited to: placement of fill material, ditching activities when the excavated material is sidecast, mechanized land clearing, land leveling, most road construction, and dam construction. The Corps of Engineers' permit process requires coordination with the USFWS and the State Historic Preservation Office (SHPO) to allow for the assessment of potential impacts to protected species and cultural resources.

NTC Regulation 350-3, *Range Regulation*, provides considerable protection of wetlands from military training damage. Excerpts from Para. 4-5f include, "*There are numerous springs found on Fort Irwin. These springs are vital to the desert wildlife. No vehicle or foot traffic is authorized around springs or vegetation in the spring area.*"

Other sections of this INRMP have provisions to protect springs and, therefore, wetlands. Provisions are found within *Springs and Seeps* (Section 9.4.2.1), *Training Requirements Integration* (Section 9.13), *Military Personnel Awareness* (Section 11.1), and *NEPA* (Chapter 14).

9.6.1 Proposed Action

Goal: Manage wetlands to ensure "no net loss" per Executive Order 11990.

Objective 1. Use the environmental review process to protect wetlands.

Objective 2. Regularly inspect springs on both a formal and opportunistic basis.

Objective 3. Provide certified jurisdictional wetland delineations (and permit application, if necessary) if a project is planned in a suspected wetland.

Objective 4. Work with troop units to ensure compliance with spring protection provisions within Range Regulation 350-3, using the ITAM Office Environmental Awareness program.

9.6.2 Other Management Options

There are no management options contrary to the goal of "no net loss" since it is legally mandated. Between the above objectives, the management of springs (Section 9.4.2.1), and the removal of invasive, non-native plants from springs (Section 9.10.1.2), the installation is accomplishing maximum efforts to protect its wetlands and meet legal mandates.

9.7 Water Quality

The NTC & Fort Irwin has its own drinking and other-use water supply system and reasonably high quality groundwater (sections 4.2 and 6.4.2), and it intends to preserve that quality. Section 8.3 describes water quality monitoring.

AR 200-1 establishes the following objectives for water resources on Army lands:

- Conserve all water resources.
- Control or eliminate sources of pollution to surface or ground waters through conventional or innovative treatment systems.
- Demonstrate leadership in attaining the national goal of zero discharge of water pollutants.
- Provide drinking water that meets applicable standards.
- Cooperate with federal, state, and local regulatory authorities in forming and implementing water pollution control plans.
- Control or eliminate runoff and erosion through sound vegetative and land management practices.
- Consider non-point source pollution abatement in all construction, installation operations, and land management plans and activities.

An additional Army requirement is the preparation and implementation of a Stormwater Management Plan. Attainment of most of the above objectives is not the responsibility of Army installation natural resources programs, but some of them, especially the last two, are clearly natural resources management concerns. Below sections specifically deal with actions taken by the installation with regard to water quality.

Most water quality laws and regulations are not the responsibility of natural resources organizations at the NTC & Fort Irwin, and are thus not within this INRMP. Groundwater management consists of restoration projects associated with individual sources of pollution. Some waters on the Training Center are naturally high in undesirable elements. These projects are not considered as natural resources management and are not included within this INRMP.

Erosion is not a significant recognized threat to water quality on the Training Center, largely due to very limited permanent surface waters and the protected status of the land around springs. The implementation of the LRAM component of ITAM (Section 9.8) has enhanced the installation's ability to protect water quality from sedimentation.

9.7.1 Proposed Action

Goal. Protect surface water quality in NTC & Fort Irwin springs.

Objective 1. Control or eliminate runoff and erosion that could affect springs.

Objective 2. Consider non-point source pollution abatement in construction, installation operations, and land management plans and activities.

9.7.2 Other Management Options

The installation is not legally required to control runoff or erosion that could affect springs. Thus, Objective 1 could be dropped. However, the NTC & Fort Irwin is mandated, by regulation if not law, to consider non-point pollution in its activities. Thus, there are no viable options to Objective 2.

9.8 Land Rehabilitation and Maintenance

Land Rehabilitation and Maintenance (LRAM), a component of ITAM, involves a variety of techniques to

repair lands damaged by training and minimize future impacts to training lands. LRAM uses technologies, such as revegetation and erosion control structures, to maintain training areas by preventing site degradation, minimizing soil erosion, reducing dust emissions, and restoring or maintaining vegetative cover. These efforts are specifically designed to maintain quality military training lands, minimize long-term costs associated with land rehabilitation, vehicle maintenance, or additional land purchase, ensure compliance with environmental laws and regulations, and reduce erosion. The NTC & Fort Irwin implemented its first LRAM project and hired its first LRAM Coordinator in 1995.

LRAM project funding applies to sites, which are not currently out of compliance or are negatively impacting training. If environmental Notices of Violation are either pending or existing on a given site, the project is not eligible for LRAM funding. Likewise, if a degraded site is not affecting training capability, the project is not eligible for LRAM funding. If land is degraded through erosion and vegetative loss not caused by training and if it is either in noncompliance with environmental laws or not affecting training, it is eligible for environmental funding.

9.8.1 Proposed Action

9.8.1.1 Revegetation and Erosion Control

Potential Project Site Selection

The NTC & Fort Irwin has a five-year erosion control plan (MacAller *et al.*, 1998) which identifies 146 sites where erosion damage is evident on the NTC & Fort Irwin. The following information is available for each site:

- site number;
- location by corridor (Southern, Central, or Northern), training area, and UTM;
- size of area;
- predominant vegetation;
- degree of compaction; and
- priority for rehabilitation.

Priorities were assigned using the following considerations:

- safety factors and training usage (*i.e.* a deep gully in a heavily used area would rank high),
- visibility (*i.e.* areas near the cantonment area or major roads rank high), and
- likely rehabilitation success.

The erosion control plan provides potential LRAM project sites, as well as sites for which projects may be eligible for environmental funding. Many sites identified in the erosion control plan are too large for single projects and will require multiple projects over many years. The nature of training at the NTC & Fort Irwin is such that other sites may develop during the next five years, and priorities may change. LRAM projects may be changed to reflect these developments. Projects are prioritized and scheduled via annual updates to the ITAM 5 Year Plan. The following general geographic priorities for LRAM projects have been identified (U.S. Army, National Training Center and Fort Irwin, 1997a):

- 1998 - Southern and Central corridors,
- 1999 - Northern Corridor,
- 2000 - Northern Corridor followed by the Southern and Central corridors, and
- 2001-2005 - sustainment and maintenance.

Project Design

Project design is accomplished inhouse by the ITAM team. Techniques used are specific to each project. The erosion control plan (MacAller *et al.*, 1998) provides the following general and site-specific land management and rehabilitation practices recommended for the NTC & Fort Irwin:

- seed collection,
- soil amendments,
- gully control,
- direct seeding,
- container plants,
- protecting natural volunteers,
- vegetation islands,
- artificial soil stabilizers,
- monitoring sites,
- selecting appropriate species for revegetation, and
- site protection from further disturbance.

More revegetation and erosion control methods specific to the problems and conditions at the NTC & Fort Irwin are under development. General recommendations provide the basis for LRAM project design. Project design options include site preparation (generally involving decompaction, often by ripping), revegetation, erosion control, dust abatement, control of exotic plants, establishment of protected areas, and any other activities which contribute to the rehabilitation or improvement of land resources. The current revegetation program includes the use of nursery-grown native shrubs and grasses and seeds of native species collected from the general vicinity of the NTC & Fort Irwin (see Section 9.8.1.3). Project designs for large, highly disturbed areas generally utilize a combination of planting and seeding in order to re-establish vegetation islands and replenish seed banks. In areas with existing native vegetative cover, only non-vegetative erosion control measures should be used, including sandbags, soil binders, water bars, trenches, and dissipaters. These measures preclude the introduction of non-native weedy species into the area.

Revegetation projects involve modification of surface topography to decrease surface compaction and increase the amount of natural precipitation captured at the site. Ripping, pitting, swaling, and creation of small catchment basins are examples of surface management techniques. The greatest challenge to the success of revegetation projects down range is the difficulty of providing adequate supplemental water to ensure seedling establishment.

Problems associated with water erosion, such as gullies and sedimentation, can generally be traced to upslope areas that have sustained vegetation loss. Vegetative cover protects the soil surface from the impact of precipitation, increases infiltration to decrease runoff, slows downslope flows, and stabilizes the soil within the rooting zone. Re-establishing native vegetation is an objective of erosion control projects. Mechanical means of reducing runoff and decreasing flow rates may be necessary at sites where substantial

gullies have already formed. Modification of the surface topography by pitting on moderate slopes or creating catchment basins allows more water to be captured on site. Barriers to downslope movement, such as bamboo fences, rocks, erosion control fabrics, and straw wattles are used to inhibit sheet flows. Check dams, composed of various materials placed at intervals along gullies, increase the amount of soil retained.

Trail closure is an important aspect of revegetation and erosion control. Trails may be closed for any of several reasons:

- duplication of trails,
- no value for military use,
- discourage civilian recreation trespass,
- trails leading to off-limits areas, or
- trails hazardous to human safety.

Numerous dirt roads that traverse the installation, especially along the perimeters, are not used by military personnel. These roads persist because of occasional use by civilian OHV users. Because these roads are so compacted, no native vegetation can grow on them. These roads should be restored to a native landscape.

Trail closure often includes techniques designed to make former trails appear natural to avoid future use, such as described for other revegetation projects in this section. Debris from adjacent areas (yucca logs, cacti, etc.) can be spread on the surface to help camouflage the old road. A ripper on the back of a bulldozer will often alleviate compaction to allow seed germination and root growth of native species. Percolation piping may be used to help ensure the success of such plantings, but generally this is only for the first 100 feet or so of a closed trail. Closure may also include the use of Seibert stakes (Section 9.8.1.4).

Trail definition is another means of minimizing damage and reducing the need to control erosion or revegetate areas. Trail definition projects use linear features adjacent to tank trails to identify trail width boundaries to troops using trails. Most trail definition projects involve the creation of berms with percolation pipes for irrigation of plants along these berms. One project involved a one-mile rip (100 feet wide) with 50 trenches diagonal to ripped areas. Percolation pipe was installed within the trenches, which were planted.

Vegetative islands are used to provide groupings of plants for revegetation projects. These islands can be of several types:

- basins with 2-4 plants per depression,
- mounds with 5-8 plants per mound, or
- catchment dams with planting on the upslope side.

Project Implementation and Monitoring

Project implementation involves both troop engineer units and contractors. Both Army National Guard and Reserve Component engineer units assist with implementation of LRAM projects during their training exercises.

When private contractors are used, contracts are prepared during fall for spring projects and during spring for fall projects. Contracts are developed that require a certain level of success in terms of percentages of

first-year plant survival. If these required planting success rates are not achieved, contractors must replant at their own cost. The ITAM field crew is responsible for continued maintenance after the first year including watering, repair, and replanting.

Goal 1. Select, prioritize, and design projects to return damaged areas to full training support capability.

Objective 1. Separate projects within the erosion control plan (MacAller *et al.*, 1998) into those eligible for LRAM funding and those eligible for environmental funding.

Objective 2. Use the erosion control plan (MacAller *et al.*, 1998) to initially select sites for LRAM projects.

Objective 3. Prioritize sites based on concepts within the erosion control plan (MacAller *et al.*, 1998).

Objective 4. Design projects for priority sites using general recommendations within the erosion control plan (MacAller *et al.*, 1998) as well as experience gained from other projects developed on the NTC & Fort Irwin.

Objective 5. Schedule and budget LRAM projects using updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a).

Goal 2. Rehabilitate damaged areas to the point where they can fully support military activities.

Objective 1. Use troop engineer units, private contractors, and the ITAM field crew to implement LRAM projects.

Objective 2. Continue to test erosion control techniques that appear to be suited to problems encountered at the Training Center.

Goal 3. Minimize damage and revegetation costs.

Objective. Use trail closure and trail definition to reduce damaged areas, protect sensitive resources, and improve troop safety.

Goal 4. Provide feedback to improve the design and implementation efficiency of LRAM projects via adaptive management.

Objective 1. Use inhouse resources to monitor individual LRAM projects for at least five years following project implementation.

Objective 2. Use the GIS to connect tabular databases to each LRAM project, indicating purpose, dates, techniques, success, and problems encountered, to improve the feedback mechanism.

Objective 3. Use experience gained from monitoring (qualitative and quantitative) to improve the design and implementation of future LRAM projects.

9.8.1.2 Dust Control

ITAM dust abatement programs address problems associated with wind erosion and suspension of particulates. In an undisturbed condition, native vegetation and the desert crust hold fine particles of soil in place. Removal of the vegetation and/or disruption of the crust exposes these particles which become airborne particulate matter.

There are numerous problems associated with airborne particulate matter (dust), including the following:

- compliance with air quality laws;
- human safety associated with operations within dust;
- trail width proliferation resulting from vehicles trying to stay to the side, rather than behind, other convoy vehicles;
- increased vehicle maintenance costs; and
- reduced visibility hindering military operations.

Re-establishment of plant cover is the best long-term solution to fugitive dust problems. However, in heavily traveled areas where dust abatement is necessary and revegetation is not a viable option, ITAM has turned to chemical soil stabilizers. In FY 96 several such products were tested on quarter-mile sections of a tank trail, using NRCS assistance. Based on the results of that study, a latex polymer suitable for conditions at Fort Irwin was chosen for use on established vehicle trails and other critical areas identified by trainers. It has been used with remarkable success to reduce brown-out conditions at helicopter landing, refueling, and loading sites. Chemical stabilization has been used in conjunction with native plant windbreaks to establish long-term solutions for reducing fugitive dust along vehicle trails. Depending on the amount and type of traffic on a treated surface, repeat applications may be necessary to maintain adequate dust suppression. Solutions for the extensive dust problems in heavily used, downrange areas have yet to be identified.

The application of chemical stabilizers requires considerable amounts of water that is generally only available from the cantonment area. This limits the geographical area in which dust control can be economically applied. A new product has been approved for use on the NTC & Fort Irwin that does not require addition of water and is particularly effective on fine soils (moondust). The Langford Lake Main Supply Route (MSR), Goldstone MSR, and Barstow Road are priority roads for treatment. Due to the expansive needs for dust control, the limiting factor in its application is cost.

Goal. Control dust for improved military mission accomplishment, enhanced human safety, and reduced environmental impacts.

Objective 1. Continue to identify and prioritize critical areas near the cantonment area and major tank trails for dust control projects. Schedule and budget dust control projects using updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a).

Objective 2. Implement dust control (chemical stabilization) on priority sites with the amount treated based on available funding.

Objective 3. If new technologies or products become available that appear to be feasible and cost-effective for the NTC & Fort Irwin, test these products and use results to improve the dust control program.

9.8.1.3 Native Plant Seed Collection and Propagation

A major part of the training land management program at the NTC & Fort Irwin during the next five years will include revegetation of disturbed areas (see Section 9.8.1.1). Federal regulations and a Presidential Memo (Office of the President, 1994), as well as ecosystem management strategies, increasingly dictate the use of native plant species, especially local ecotypes. Locally collected seeds have a better chance for successful germination and growth (U.S. Army, National Training Center and Fort Irwin, 1997a).

Ideally, in areas to be revegetated, plant material for revegetation should be collected from the site before disturbance occurs or from adjacent natural areas if disturbance has already occurred. Plant collections should occur two years in advance, if possible, to ensure the availability of sufficient material.

Grass, forb, and shrub seed should be collected by a qualified collector/supplier with experience in native seed collection. Seeds should be cleaned to commercially acceptable grade and tested for purity, viability, and Pure Live Seed. The ITAM field crew supplements contractor-collected seeds with special seed collections. Nurseries used for propagation must have experience with native plants and the capability to produce plants with a high percentage of root growth to survive minimal water conditions. The Joshua Tree National Park has been cooperating with the NTC & Fort Irwin for propagation of seed at Park facilities. The native seed collection program began in 1996 at the Training Center with small inhouse collections. By 1998 most seed was being custom-collected by commercial seed companies. These companies can often be contracted to provide specific species from very precise locations, using parameters such as elevation and precipitation patterns, from the NTC & Fort Irwin, if possible.

Common shrubs collected and propagated include creosote, burrobush, cheesebush, and saltbush, in addition to about 20 other, less common species. Shrub seeds must be sent to nurseries 6-16 months in advance of project revegetation dates. Forb seed is broadcast spread while grass and shrub seed are both broadcast seeded and propagated in nurseries.

Goal. Provide high quality stocks of locally adapted seed and plants to support revegetation projects on the NTC & Fort Irwin.

Objective 1. Use annual updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a) to determine native plant and seed stock requirements at least two years in advance.

Objective 2. Acquire locally adapted native seed.

Objective 3. Store seed and maintain seed quality.

Objective 4. Send seed to nurseries with Mojave Desert native plant experience for propagation.

Objective 5. Monitor the seed collection and propagation program and use results to improve the program in terms of collection processes, propagation techniques, and success in revegetation projects.

9.8.1.4 Protective Marking

The NTC & Fort Irwin needs a uniform system of marking off-limits areas to prevent further damage to sensitive areas and avoid injury to military personnel. Seibert stakes are readily identifiable markers mounted

on fence posts and marked with both reflective sheeting and thermal tape for 24-hour visibility (U.S. Army, National Training Center and Fort Irwin, 1997a).

Seibert stakes are used to mark major tank trails, such as Goldstone and Manix (from the railhead to the installation through BLM and private land); playas (Section 9.12.1.3); cultural resources sites (Section 13.2); critical habitat (Section 9.5.2.2); hazardous areas; right-of-way boundaries; springs (Section 9.4.2.1); environmental pollution restoration sites; etc. Information concerning Seibert stakes has been incorporated in the O/C Academy, OPFOR Academy, Leader Trainer Program, and the Command Brief, as well as in the soldier field cards (Section 11.1) (U.S. Army, National Training Center and Fort Irwin, 1997a). Seibert stakes are constructed and installed primarily by the ITAM field crew, occasionally assisted by volunteers, such as Boy Scouts and Cub Scouts. Seibert stakes are a standardized means to mark sites for military personnel, but they are not exclusively part of the ITAM program. They also may be installed as components of other, non-ITAM programs to identify sites.

Goal. Identify sensitive areas, nonmilitary use areas, and human safety hazardous areas to military personnel using the NTC & Fort Irwin range areas.

Objective 1. Construct and install Seibert stakes to mark sensitive areas, nonmilitary use areas, and human safety hazard areas using annual updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a) to identify and prioritize projects. When Seibert stakes are used to mark sites not part of the ITAM program, obtain funding from environmental resources.

Objective 2. Maintain existing Seibert stakes, including removal of stakes no longer required.

9.8.1.5 Applied Desert Restoration Studies

The process of large-scale rehabilitation and maintenance of arid land intensively used for military training requires the development of restoration techniques and means to monitor the success of these techniques. The installation ITAM program is committed to using the best science available to improve its support of the NTC's military mission.

The installation has used various regional institutions and their experts to develop means to monitor the biological impacts of military training on the Mojave Desert ecosystem, including the use of remote sensing and plant and animal bio-monitors. These studies are valuable to the LRAM program in that they can lead to more effective and efficient monitoring of the program's techniques. As described in sections 8.1.1, 8.2.1, and 16.3.3, these projects will be completed by 2003.

Cryptogamic crusts are closely related to the germination and success of plants (via nitrogen fixation) and stabilize the soil against erosion, all related to the success of the ITAM program. Soil disturbance, such as during military operations, breaks down these crusts. The NTC & Fort Irwin is using expertise from John Carroll University, Ohio for a pilot project to evaluate relationships between cryptogamic crusts on the Training Center and ways they can be used to enhance revegetation and dust control projects (U.S. Army, National Training Center and Fort Irwin, 1997a). The first step in this process was to evaluate the type and location of cryptogamic crusts on the NTC & Fort Irwin, accomplished in 1997. The next, ongoing phase is to use a grown inoculum from the NTC & Fort Irwin to inoculate disturbed sites to begin the process of regrowth of cryptogamic crusts and other vegetation. In addition, nitrogen fixation studies are underway to determine the relative importance of cryptogam crusts in the Mojave Desert. Results were evaluated in spring

1999 at a site near the sewage treatment lagoon. Initial results were inconclusive, so the installation plans to reevaluate the study in the future.

Fertilization is not generally recommended for revegetation in desert areas since desert plants are adapted to condition of low soil fertility and nitrogen applications often encourage the growth of weed species. Some extremely disturbed areas, however, have soil so degraded from severe compaction, disturbed soil layers, and lack of organic matter that some soil amendments, in addition to mulch, may be necessary. The NTC & Fort Irwin is planning to evaluate effects of fertilization on the growth of native plants (and weeds) in compacted, drifted, and overturned substrates of heavily damaged areas (U.S. Army, National Training Center and Fort Irwin, 1997a). This will be an inhouse project, to be completed by 1999.

The Desert Research Institute, University of Nevada, Reno is conducting a soil hydrology study during 1998-99 on the NTC & Fort Irwin. This study is modeling soil moisture, including vertical and horizontal movements on various vegetative islands (mounds, catchments, and basins), to provide a geomorphological perspective to improve design of revegetation projects within the LRAM program.

Goal. Improve the LRAM program using applied desert restoration studies.

Objective 1. Continue long-term monitoring for input into the LRAM decision model.

Objective 2. Complete the cryptogamic crust study (U.S. Army, National Training Center and Fort Irwin, 1997a) by 1999 and implement results to improve the LRAM program.

Objective 3. Complete the soil fertilization study (U.S. Army, National Training Center and Fort Irwin, 1997a) by 1999 and implement results to improve the LRAM program.

Objective 4. Complete the soil hydrology study by 1999 and implement results to improve the LRAM program.

Objective 5. As promising new techniques potentially valuable to the NTC & Fort Irwin LRAM program are discovered, use applied studies to evaluate their usefulness to the program.

9.8.2 Other Management Options

By definition, LRAM is not required by law. Thus, the LRAM program could be eliminated or scaled down to any level. However, significant cutbacks could lead to conflicts with other programs that are legally mandated. For example, if the use of Seibert stakes were curtailed, there would be conflicts between the military mission and the protection of sensitive species and cultural resources, many of which are legally protected. The same would be true if cutbacks in LRAM were to increase erosion threats to cultural resources or affect sensitive plant or animal species habitat. Thus, significant reductions in the LRAM program could result in the requirement to increase the scope of other natural or cultural resources programs. However, since other options for repairing military damaged lands were not specifically designed for this purpose, it would be difficult to find substitute programs that are as effective or efficient as the LRAM program.

The 1997 amendments to the Sikes Act added the requirement for no net loss in the capability of the land to

support the military mission of military installations. Thus, even though this law does not specify the implementation of LRAM, it does require programs similar to LRAM if the land is being degraded in terms of its capability to support military operations.

It might be possible to legally scale back the LRAM program and still meet legal requirements. However, since the NTC & Fort Irwin is classified in the highest priority for ITAM funding category, it is not feasible to significantly increase LRAM funding unless Army-wide ITAM program funding is similarly increased.

9.8.3 Proposed Land Expansion

The LRAM component of ITAM is developing plans for potential land expansion areas but implementation will depend on final land expansion decisions (U.S. Army, National Training Center and Fort Irwin, 1997a). These lands are beyond the boundaries of the NTC & Fort Irwin, and these programs are, thus, not part of this INRMP. The INRMP will be modified as necessary to include this program when land expansion becomes reality.

9.9 Cantonment Management

The cantonment is described in Section 7.1.2. It is, in short, the area inside the Outer Loop Road. This area has legal status with regard to desert tortoise management. Activities inside the cantonment do not require Section 7 consultation. There are 268 acres of improved lands (e.g. lawns, athletic fields, golf areas, landfill, playgrounds, and parks) on the installation, which require annual maintenance. There are about 1,630 acres of semi-improved lands (e.g. ammunition storage, airfields, and heliports) which require periodic maintenance, but to a lesser degree than on improved lands (Quillman, 1997).

Grounds maintenance and landscaping within the cantonment at the NTC & Fort Irwin are accomplished by a contractor under the Base Operations Contractor. The Natural and Cultural Resources Section provides technical advice when requested. This section deals with those specific actions within the cantonment that directly support the natural resources program.

A comprehensive landscape-planting plan has been developed to provide guidance and consistency for landscaping different areas on post. The plan is functional in nature, simple, informal in design, and compatible and complementary with adjacent surroundings and natural environment. The plan emphasizes the use of native, low-maintenance plants, in accordance with a Presidential Memorandum (Office of the President, 1994) on the use of native species on federal lands. The Landscape-Planting plan should be revised every five years.

Landscaping should use drought-tolerant plant species. When possible, native plants should be used to increase habitat for native wildlife species. Exotic species that can out-compete native vegetation and become naturalized should not be used. The use of native, drought-tolerant species decreases water use and maintenance activities. The installation uses heavy applications of mulch, created from pruning debris, to reduce water use and increase landscape-planting survival. Caution should be exercised to not use pruning debris from tamarisk as mulch material inhibits propagation of the species.

9.9.1 Proposed Action

Goal. Maintain an aesthetically pleasing cantonment area landscape that maintains natural ecosystem functions as much as possible.

Objective 1. Implement the landscape-planting plan.

Objective 2. Provide professional advice to guide the grounds landscaping and maintenance program toward the use of native species and drought-tolerant species.

Objective 3. Use drip irrigation as much as possible when irrigation is required.

9.9.2 Other Management Options

There are no legal requirements to manage improved grounds to the extent that is done at the NTC & Fort Irwin. However, there are requirements (*e.g.*, Office of the President, 1994; AR 200-3) to use native species and reduce water usage for plantings. Thus, the grounds maintenance program could be scaled back, but not eliminated. On the other hand, it could be significantly increased, particularly if increases involved xeriscaping. However, considering budget cutbacks, grounds maintenance programs are not likely to be significantly enhanced in the near future.

9.10 Pest Management

Cantonment area pest management on the NTC & Fort Irwin is primarily accomplished by a contractor under the Base Operations Contractor. The Natural and Cultural Resources Section provides technical advice when requested. The Natural and Cultural Resources Program Manager has been designated as the Installation Pest Management Coordinator. The Natural and Cultural Resources Section and the ITAM Office are also directly involved in pest management programs.

The installation has a Pest Management Plan (Quillman, 1997) upon which most of the below discussion is based. This plan identifies and prioritizes pests and their destructive effects to determine particular levels of protection. The plan emphasizes pest management within the cantonment area.

Integrated pest management (IPM) is used at the NTC & Fort Irwin, and typically a combination of IPM techniques is required to resolve a problem on a sustained basis. IPM includes the implementation and coordination of optimum sanitation, good structural design and maintenance of facilities, mechanical control, cultural control, biological control, and regulatory control.

Pest control efforts are implemented on the basis of surveillance. Pest surveys are necessary to determine the type of pest, extent of problem, and pest management technique most appropriate for safe, effective, and economic control.

The Office of the President (1994) called upon heads of federal agencies to reduce the amount of pesticide use by using IPM practices. The NTC & Fort Irwin has a policy of only using chemical control when non-chemical techniques are inadequate or impractical. Furthermore, chemical control will not be used as a substitute for good sanitary practices or proper building maintenance.

The NTC & Fort Irwin (Quillman, 1997) recognizes eight categories of pests or undesirable vegetation that cause significant damage and require control or management. In order of priority, they are:

- disease vectors and medically important pests (e.g., gnats, mosquitoes, black widow spiders, scorpions, bees and other stinging insects, and filth flies);
- quarantine pests, of which there typically are none on the NTC & Fort Irwin;
- real property pests (e.g., subterranean termites, which have been documented in fence posts and other earth-wood contact situations, but not in buildings);
- stored products pests, occasionally found in food facilities and food-storage warehouses;
- ornamental plant and turf pests (e.g., elm leaf beetles and aphids);
- weeds and other undesirable vegetation, including invasive, exotic species on unimproved grounds (Russian thistle, saltcedar);
- vertebrate animal pests (e.g., feral burros, mice, ravens, coyotes, rattlesnakes, stray pets); and
- household and nuisance pests (e.g., cockroaches, ants, spiders, crickets, fleas, beetles).

9.10.1 Proposed Action

The Pest Management Plan (Quillman, 1997) discusses many aspects of pest management that are not directly within the scope of this INRMP, such as control of disease vectors. Below discussions of animal and plant control are specific to the management of natural resources on the installation as opposed to those programs designed primarily for the cantonment area, generally dealing with arthropods and weeds.

9.10.1.1 Animal Control

Goal. Control pest animals to support the military mission, promote sustained ecosystem functionality, favor native species biodiversity, and add to the quality of life of the NTC & Fort Irwin community.

Section 6.7.7 described pest species important to natural resources management on the installation. Populations of ravens and coyotes, both considered to be serious pests at the NTC & Fort Irwin, are artificially inflated in many desert areas by ready access to refuse sites.

Coyotes

The coyote is a known predator of the desert tortoise. Efforts will be taken to minimize the proliferation of this species on the NTC & Fort Irwin. Because natural food sources are supplemented by trash generated on the installation, proper handling and disposal of trash, maintenance of the landfill, and education will be the focus of management efforts. Informational stickers reminding personnel to keep trash bins covered at all times were placed on all trash receptacles beginning April 1996. In April 1999 a new landfill cell was completed, which facilitates improved trash control. The new cell will be placed into service when the current cell is full. Trash will be compacted into modules in a warehouse and moved into the new cell. Modules will then be covered with plastic tarps and then buried when enough modules accumulate. A litter removal program (*Hands Across the Desert*) has been in effect for over ten years. This program and other efforts to remove or minimize trash reduce the attraction of coyotes to bivouac and training areas.

The Natural Resources Manager has been designated by the Garrison Commander as the NTC & Fort Irwin

Game Warden. As such, he is responsible for decisions related to removal of coyotes. It is a violation of NTC & Fort Irwin policy to feed coyotes. Anyone caught feeding coyotes is subject to disciplinary action. Coyotes, which are being fed, will be trapped using live-traps or tranquilized using tranquilizer guns. Military Police and the Game Warden are authorized to administer tranquilizer drugs by dart guns. Dated coyotes will be examined by the Post Veterinarian and then relocated some distance from the Cantonment Area. Under extreme situations, the Game Warden or Military Police may obtain a shotgun from the Provost Marshal's Office and remove coyotes with lethal force. Lethal force is authorized for coyotes whenever human safety is at risk (e.g., aggressive, injured, or sick coyotes). Lethal force may also be used when coyotes are gathering in large numbers where they could present a safety concern (e.g., at the sanitary landfill).

Objective 1. Promptly place all trash generated at bivouac or training areas in covered containers and remove for disposal at the NTC & Fort Irwin landfill when the training unit leaves the area.

Objective 2. Place tarpaulins over trash in the vehicles that haul material to the landfill.

Objective 3. Cover the active area of the landfill with at least six inches of topsoil during daily operations and at the end of the day to reduce the site's attractiveness to coyotes.

Objective 4. Continue to educate soldiers and other personnel about the importance of proper disposal of unused food items and other refuse.

Ravens

The common raven is a known predator of the desert tortoise. The discussion pertaining to coyotes (immediately above) is also applicable to ravens. Objectives 1-4 will help alleviate problems associated with ravens at the NTC & Fort Irwin.

Objective 5. Control raven numbers, based on a study (USGS, Biological Resources Division) of the status and trends of raven populations and their potential impacts on the desert tortoise populations on the NTC & Fort Irwin, in cooperation with USFWS and CDFG. Ravens will be trapped with use of rocket nets.

Objective 6. Conduct raven population surveys and nest surveys in 2000.

Burros

Feral burros are a management concern because of negative impacts on soils, vegetation, and water quality in the areas where they persist. Burros are primarily found in the northern and northwestern portions of the Training Center. There are thought to be 75-150 burros that use the installation (Dave Sjaastad, BLM Horse and Burro Manager, Ridgecrest, CA., personal communication, 1998).

The NTC & Fort Irwin, Naval Air Weapons Station China Lake, BLM, and Death Valley National Park have agreed to a goal of zero burros on various lands including the NTC & Fort Irwin. Burros can be captured using helicopter roundups and traps at water sites. Captured burros are removed via the BLM Adopt a Horse and Burro program.

Objective 7. By 2002 provide burro exclusions (allowing bighorn sheep entry) on springs in areas frequented

by burros.

Objective 8. By 2002 use helicopter roundups and traps at water sites, particularly at Leach Springs and Two Springs, to provide Fort Irwin's part of the 200 burros per month quota for the combined agencies' areas.

Objective 9. Use periodic roundups and trapping to remove burros until all are removed, and maintain this zero status with removal as required.

Rattlesnakes

Speckled, Mohave green, and sidewinder rattlesnakes occasionally are found in developed areas on the installation, particularly the Cantonment Area. NTC regulations prohibit the collection of reptiles or other wildlife on the NTC & Fort Irwin.

Objective 10. Relocate problem rattlesnakes to range areas. The pest control contractor, All Pro Pest Control, will handle removal of rattlesnakes from the cantonment area. They can be reached at (760) 380-4099.

Stray Pets

Stray pets on the range area are not a significant problem on the NTC & Fort Irwin. These domestic animals are not adapted to survive in desert conditions and are often removed by predators, particularly the coyote.

Native Venomous Invertebrates

Unless there are unusual circumstances, native venomous invertebrates (e.g., black widow spiders, scorpions) are not actively controlled as part of the pest management program.

Africanized bees have been discovered on the NTC & Fort Irwin. Any swarms of bees are considered to be Africanized, and the pest control office should be notified immediately to handle the situation. The phone number is (760) 380-4099.

9.10.1.2 Plant Control

Non-native and/or noxious weeds pose threats to native habitats, endangered species, and plant community composition and diversity. More specifically, they threaten vital spring ecosystems, complicate LRAM implementation, add to the cost of pest management, and in general, threaten ecosystem functionality.

Goal. Control noxious and invasive, exotic plants to support the military mission, promote sustained ecosystem functionality, favor native species biodiversity, and add to the quality of life of the NTC & Fort Irwin community.

Objective 1. Map the distribution and abundance of non-native, invasive species (e.g., *Tamarix ramosissima*, *Salsola tragus*).

Objective 2. Prioritize sites that require invasive plant management (e.g., springs, see Section 9.4.2.1).

Objective 3. Develop an action plan for exotic plant control on the Training Center, including the above-listed map and priority sites, a rating of each species for its difficulty of control, methods of control for all species based on their respective life histories, and a description of means used by each species to spread from site to site.

Objective 4. Conduct an applied study of mechanical and chemical Russian thistle control as part of a revegetation project, implement the project in 2001.

Objective 5. Continue to seek funding for exotic weed control.

9.10.1.3 Measures of Merit

In 1994 the Army approved the following three Measures of Merit that defined the course of Pest Management programs through the year 2003:

- Have a current pest management plan by the end of FY 01.
- Reduce pesticide use by 50% over a seven-year period (1994-2000).
- Have pesticide applicators certified within two years of employment by end of FY 98.

The Pest Management Plan is current. All chemicals used on the NTC & Fort Irwin are EPA-approved. Integrated pest management techniques (snap traps, glue boards, screening, heat treatment for termites, etc.) have enabled the installation to reduce its use of pesticides by over 50% compared to the base year. The installation understands both obvious and long term threats to both humans and ecosystem functions from pesticides. Applicators are contractors who must meet certification requirements.

Goal. Meet Department of Army Measures of Merit for pest management programs on Army installations.

Objective 1. Annually review the Pest Management Plan (Quillman, 1997). Incorporate updates into the plan on a five-year cycle.

Objective 2. Emphasize integrated pest management techniques to continue to minimize the use of pesticides.

Objective 3. Ensure contractor personnel are State-certified applicators.

9.10.1.4 Environmental Considerations

The presence of threatened, endangered, or species of concern and their habitat, especially the Mohave ground squirrel, requires that special precautions be followed closely during any pest management activities that could affect these species. Wetlands require special precautions if pesticides are used in their vicinity. A survey indicated that about one percent of *Peromyscus* are infected with hantavirus, a disease with potentially lethal human health implications.

Goal 1. Use pesticides in a manner to minimize impacts to sensitive animal and plant species.

Objective 1. Follow precautionary statements on labels regarding contamination of water when pesticides are

sprayed near wetlands.

Objective 2. Take special precautions during pest management activities that could affect endangered species or species of concern, particularly by using non-chemical treatments in areas with Mohave ground squirrels.

Goal 2. Minimize environmental risks to human health while conducting pest management programs.

Objective. Ensure that personnel dealing with rodent control are aware of the potential for hantavirus and take appropriate precautions to avoid exposure.

9.10.2 Other Management Options

Some aspects of the animal control program (reduction of raven and coyote predation on desert tortoises) are related to compliance with the Endangered Species Act, and although there may be different options to accomplish the reduced predation, these reductions must be accomplished. Control of coyote predation, in particular, could be far more drastic, but there are biological questions regarding the need for direct coyote control, and cost/benefits might be too high.

The burro removal program could be reduced or eliminated, but a higher degree of control is not possible since the goal is zero burros. Allowing burros to remain a significant non-native part of the ecosystem is not a viable option if ecosystem management and biodiversity commitments are to be met (sections 1.2 and 1.5).

The control or elimination of invasive, non-native plants could be adjusted, but only if restricted by budgetary considerations (Executive Order 13112, *Invasive Species*). A non-control strategy would not comply with this Executive Order and would have other legal ramifications in terms of these species effects on protected plant or animal species or wetland functions.

Control of exotic species and protection of moderately disturbed areas are two indirect means of managing training lands. Non-native species, such as *Tamarix ramossisma* (salt cedar), *Salsola tragus* (Russian thistle), and *Schismus barbatus* (Schismus grass), often invade disturbed areas and out-compete native species for water and nutrients. They create conditions that are both detrimental to training and unfavorable to the re-establishment of native species. An aggressive exotic species control program, which does not currently exist at the NTC & Fort Irwin, could increase the effectiveness of the present revegetation program (Section 9.8.1.1). However, the creation of such a program would require an increase in the DPW Environmental budget.

The Department of Defense and Department of Army are committed to achieving the three Measures of Merit discussed in Section 9.10.1.3. The NTC & Fort Irwin are thus committed to these same goals. There are no alternatives to achieving an updated pest management plan or requiring applicators to meet certification requirements. There are many options within integrated pest management strategies to accomplish a reduction of pesticide use. However, the means used at the Training Center have accomplished the goal of this Measure of Merit, so changes do not seem viable unless they improve either the efficiency or effectiveness of the program.

Considering laws requiring the protection of wetlands, there is no viable alternative to the objective to use caution when applying pesticides near wetlands. The same is true of measures taken to protect sensitive species, such as the Mohave ground squirrel. There is no legal requirement to reduce exposure to hantavirus,

but human health commitments by the Army and the NTC & Fort Irwin make noncompliance with this objective nonviable.

Other pest management programs are either not an integral part of natural resources management (and thus not covered by this analysis), are required by human health regulations, or are optional (to either a lesser or greater degree of implementation) as they are quality of life-related programs. These will not be further discussed with regard to options.

9.11 Fire Management

Wildfires are a threat to the Mojave Desert ecosystem, including endangered, threatened, or otherwise sensitive plant and animal species. Fires encourage the spread of exotic plant species resulting in an increase in fire intensity and frequency. This is especially true in areas, such as gunnery ranges, which experience frequent fires. Fire management on the NTC & Fort Irwin consists of rapid response and effective control of fires. The goal is complete control as quickly as possible. Fire suppression is part of the Base Operations Contract. Prescribed burning is not a viable option for ecosystem management in the Mojave Desert ecosystem due to the evolution of the vegetation without regular fire.

9.11.1 Proposed Action

Goal. Provide protection for lands and natural resources from wildfires.

Objective 1. Require all troop units and other installation personnel to report wildfires as soon as possible.

Objective 2. Respond to wildfires as soon as possible and begin immediate suppression, consistent with safety related to unexploded ordnance.

Objective 3. Suppress wildfires as soon as possible.

Objective 4. Incorporate burn areas as a GIS data layer for tracking and possible rehabilitation.

Objective 5. Investigate the potential value and costs associated with the establishment of firebreaks around high risk areas.

Objective 6. Determine methods for treatment of burn areas to reduce invasion by exotic species.

Objective 7. Establish a database to capture fire occurrence and suppression data, such as location, date/time, weather conditions, cause, size, time to suppression, etc.

9.11.2 Other Management Options

It is difficult to develop a more thorough program for the protection of NTC & Fort Irwin lands from wildfires without significant additional expenditures of funds. The commitment is very high, justifiably so since the military mission causes most fires. A lesser commitment to wildfire protection with lesser requirements for reporting, response, and suppression is possible. This would likely have profound effects on the desert ecosystem, as this ecosystem is very prone to physical and functional damage from fires.

Prescribed burning is not an identified option for the management or protection of the Mojave Desert ecosystem.

9.12 Special Interest Area Protection

Designation of special protection status for unique or fragile areas is an important management tool. It is more cost effective to put use restrictions on some areas to minimize damage or disturbance than to mitigate damage or disturbance. The NTC & Fort Irwin has areas with special natural features. They harbor sensitive or unique wildlife species and/or have unique plant communities.

9.12.1 Proposed Action

Goal. Provide protection for areas of special ecological concern.

9.12.1.1 General Provisions

As part of project review and the NEPA process, the Natural and Cultural Resources Section reviews proposed projects and activities at the NTC & Fort Irwin. Natural resources managers can identify concerns and recommend measures to minimize damage. Examples include avoiding springs, filling excavations after exercises, and siting missions in areas suited to the mission needs and environmental considerations. See Chapters 14 for more information on the use of NEPA. Wetlands and cultural resources sites are special interest areas, but programs for their protection are outlined in Section 9.6 and Chapter 13 respectively, so they are not included within this section. The same is true with threatened or endangered species habitat (discussed in Section 9.5.2), but special interest sites may also support these plant and animal species.

Objective 1. Use project review and the NEPA process to protect special interest areas.

Objective 2. Use GIS to identify areas of special interest to natural and cultural resources managers, project planners, military planners, and personnel using the NTC & Fort Irwin.

9.12.1.2 Springs

Springs (Section 6.4.1) are critical to many plant and wildlife species within the Mojave Desert, including federal- and State-listed species.

Objective 3. Recognize springs and associated buffer areas of at least 220 yards (200 m) as off-limits.

Objective 4. Erect fencing, metal crossbars, signs, and Seibert stakes (see Section 9.8.1.4) at portions of these springs likely to be approached by wheeled and tracked vehicles to reduce accidental intrusion into and subsequent damage to these resources. Check fences around springs for damage after each rotation and repair or replace fencing, signage, or Seibert stakes as needed.

Objective 5. Educate field personnel about the off-limits nature of spring locations as part of major briefings prior to each military exercise to avoid impacts by military equipment and personnel on natural and cultural resources associated with spring areas.

9.12.1.3 Playas

Playas (Section 6.4.1) are critical to specialized plant and wildlife species within the Mojave Desert. When playa crusts are disturbed, wind erosion creates problems with air quality which can create safety hazards during military operations. Due to playas' potential to generate finely divided particulate matter (PM 10), they are avoided during military maneuvers. Playas also frequently have archeological sites on their perimeters.

Objective 6. Designate playas (except Red Pass Lake, Bicycle Lake airstrip, and Langford Lake) as off-limits to be avoided by military personnel because of potential impacts to associated biological and cultural resources.

9.12.1.4 Joshua Trees

The Joshua tree is a Species of Special Concern in California, and its distribution and density are limited on the NTC & Fort Irwin.

Objective 7. Require approval from the Natural and Cultural Resources Section for removal of Joshua trees in proposed project footprints.

Objective 8. If removal is necessary, re-locate trees to sites with the same orientation and similar characteristics as their original sites to reduce the risk of tree mortality.

9.12.1.5 Goldstone Complex

The Goldstone Complex has some unique ecological characteristics that deserve protection. However, the primary reason the Goldstone Complex is excluded from most military activities is the unique and sensitive NASA mission of the Complex.

9.12.2 Other Management Options

Many programs to protect special interest areas are driven by direct or indirect regulatory requirements. There are no options to the use of NEPA to identify threats to these areas. The protection of springs is not directly required by law, but the destruction of spring resources would be contrary to wetlands protection and possibly the protection of listed species; thus, viable options are not readily available, particularly for the long term.

Protection of playa features also have legal implications, particularly with regard to cultural resources and air quality considerations. Soldier safety issues are also involved regarding use of playas. However, strictly speaking, more playas could be opened for military training, or conversely, Red Pass Lake and Langford Lake playas could also be placed off-limits.

The protection of Joshua trees is not legally mandated. Thus, the program could be dropped, or protection could be made more absolute. Features to isolate the Goldstone Complex from military use are a matter of national priorities, but there are also natural and cultural resources issues involved. Regardless, the NTC & Fort Irwin, by itself, has few options with regard to the use of Goldstone.

9.13 Training Requirements Integration

Training Requirements Integration (TRI) is the direct interface between training requirements for land use and the capability of the land and its natural resources to support that training. TRI relies on LCTA and other monitoring programs to determine land capabilities.

9.13.1 Proposed Action

Goal. Integrate NTC and Fort Irwin training requirements for land use with the sustained capability of the land to support such use.

9.13.1.1 Mission Planning

As indicated in Section 16.3.2, the NTC & Fort Irwin GIS has proven capabilities to assist with the planning of military operations and scenarios. The technology can produce maps with overlays that help military commanders visualize special requirements, and terrain can be shown in 3-D to enable personnel to better visualize battlefields. As has also been proven, the GIS can be used to improve troop safety by providing analyses of past accidents in terms of locations to be avoided or where special precautions are prudent.

Objective 1. Assist military mission planners and scenario writers using visualization tools and overlays on imagery and spatial analysis of data layers.

9.13.1.3 Training Restrictions

Restrictions on training are sometimes necessary for long-term sustainment of training and ecosystem protection. In the case of the NTC & Fort Irwin, these restrictions emphasize reducing impacts to native vegetation, providing protection for certain sensitive species and cultural resources, and avoiding conflicts with the mission at the Goldstone Complex. The Training Center includes environmental regulations that directly impact training in Regulation 350-3, *Range Regulation* (U.S. Army, National Training Center and Fort Irwin, 1996).

Objective 2. Use training restrictions, when required, to protect sensitive natural resources and minimize damage to training areas.

Objective 3. Ensure that environmental regulations and restrictions to training have command support.

9.13.2 Other Management Options

Neither land-sustainment mission siting or improved military planning is absolutely required for compliance. Therefore, both projects could be either degraded or enhanced. However, if mission siting does not take long-term mission sustainability into account, eventually (in the short-term in most cases) the capability of the land to support the military mission will be degraded, a violation of the Sikes Act.

Training restrictions are not imposed on the NTC & Fort Irwin without strong rationales, generally related to environmental compliance or human safety. Therefore, there are few viable options for removing most training restrictions. Additional training restrictions could be imposed, but only if it can be shown that they

do not degrade the quality of military training at the Training Center or that they are required for compliance or safety.

Protecting areas, which have not yet become irreversibly damaged, would be a cost-effective way of rehabilitating portions of the training area. Land may recover from 90% disturbance much faster than from 98% disturbance. Resting an area while remaining plants are still capable of producing seed would reduce the large expenditure on plant materials normally associated with revegetation projects. This could be implemented by periodically limiting access to, or designing battle scenarios around, selected sites as identified by LCTA monitoring and SRP plots.

10.0 ENFORCEMENT

Many aspects of natural resources management require effective enforcement. Programs, such as endangered species protection, off-highway vehicle recreation, protection of sensitive areas, hunting, etc., are very dependent upon effective law enforcement.

The Garrison Commander has appointed the Natural Resources Manager as the Game Warden, but specific officers with dedicated natural resources duties have not been appointed. Military Police personnel are authorized to check for post hunting permits, but not to enforce State hunting license requirements. Range enforcement is generally accomplished coincidental with other duties or in response to specific situations. Thus, a natural resources law enforcement presence is not apparent on the NTC & Fort Irwin, and the potential for illegal natural resources activities is increased due to this deficiency.

Off-highway vehicles are a problem in a few areas near installation boundaries. Scrappers (persons who enter military reservations to steal ordnance and other items from range areas) are a serious problem on installations in the Southwest (and elsewhere). It is uncertain to what degree scrappers are operating at the NTC & Fort Irwin but they are thought to be active in the northern portion of the installation. The installation has the potential for significant losses due to theft or vandalism of cultural resources. The size and remote location of the Training Center are significant challenges to effective enforcement.

Per NTC Reg. 420-3, the Provost Marshal is responsible for the following activities relating to natural resources:

- enforcement of hunting laws and regulations,
- firearms registration,
- field checks of hunters,
- action to terminate unauthorized activities,
- apprehension and detention of violators,
- providing information to hunters and coordination of missing hunter actions, and
- control of unauthorized entry to restricted areas, coordinating with the G-3.

The G3 Training promulgates the *Range Regulation* (NTC Reg. 350-3), which contains regulations for use of range areas. This regulation requires individual military units to assume responsibility for compliance with regulations.

The CDFG is available for support of wildlife-related laws and other issues, as needed. The hunting program at the NTC & Fort Irwin is so limited and tightly controlled that CDFG enforcement assistance seldom is needed. The CDFG has been involved in issues such as mountain lion complaints. Poaching is not an identified enforcement issue on the installation.

The NTC & Fort Irwin uses the Federal Magistrate Court to adjudicate civilian violators who are issued citations. The Uniform Code of Military Justice is used for cases cited using the Military Police Report system. State and federal enforcement officers use District or State courts for case adjudication.

10.1 Proposed Action

Goal. Assure legal compliance of military and civilian activities with regard to natural and cultural resources on the NTC & Fort Irwin.

Objective 1. Maintain a law enforcement program for military and civilian activities on the NTC & Fort Irwin range areas.

Objective 2. Coordinate enforcement activities with other agencies, particularly the CDFG.

Objective 3. As soon as possible, train the Natural and Cultural Resources Manager and the Archeologist in enforcement of the Archeological Resources Protection Act, using a BLM-sponsored course.

10.2 Other Management Options

The natural resources enforcement program is minimal at the NTC & Fort Irwin. Reduced program emphasis is not a viable option.

The natural resources enforcement program could be significantly enhanced, which would be consistent with 1997 revisions to the Sikes Act which emphasizes professional enforcement of natural resources laws on military reservations. Permanent civilian enforcement officers could be hired and trained in natural resources enforcement, such as has occurred on many other military installations. However, these options require additional permanent civilian authorizations and increased budgets, both unlikely considering trends in civilian personnel levels and budgets within the Department of Defense.

11.0 AWARENESS

Conservation awareness is instrumental in creating conditions needed to protect and manage natural resources. The NTC and Fort Irwin approach to awareness stresses education. It provides military personnel and the public with insights into the installation's natural environment and conservation challenges. The more people know about the installation's unique and sensitive natural resources, the more responsibly they act toward them. A conservation awareness program must be directed to both installation and external interests to be effective.

The NTC & Fort Irwin provides an extensive and dynamic natural resources awareness program. The program covers topics including hazardous waste spill prevention and response, natural resources management, desert safety, resources protection, desert tortoise protocol, unexploded ordnance precautions, and similar items.

General Goal 1. Provide information to soldiers and civilians so they remain safe while they are at the Training Center.

General Goal 2. Educate users to minimize impacts to the land and natural resources to maintain and enhance training.

11.1 Military Personnel Awareness

Environmental Awareness is a component of ITAM that fosters a conservation ethic in those who use NTC & Fort Irwin lands to preserve the capability of training lands to indefinitely sustain the military mission. The Environmental Awareness program was initiated in 1996 on the NTC & Fort Irwin, and the program rapidly developed during 1996-97. Major tools for military personnel awareness through the ITAM program include briefings, training posters, handouts, and natural and cultural resources videos (U.S. Army, National Training Center and Fort Irwin, 1997a).

Both home station units and visiting soldiers receive environmental awareness briefings. NTC & Fort Irwin soldiers are briefed through the Observer Controller Academy, Opposing Force (OPFOR) Academy, the National Guard and Reserve Component, and requested safety briefings. Visiting units receive briefings through the Leaders Training Program and requested briefings. Both groups receive take-home pamphlets, booklets, and maps. There are also exportable (CD ROM, ZIP, Internet) briefings, available upon request for those who may not be able to attend scheduled briefings. These CD briefings are sent to rotational units prior to their arrival to the Training Center to be used at their home stations.

Another aspect of awareness programs at the NTC & Fort Irwin is personnel safety. There are hazards associated with training on the rugged lands at the Training Center. Safety information and material are often disseminated during environmental awareness training.

The Natural and Cultural Resources Section supports the Environmental Awareness program since many of its programs are dependent upon developing soldier conservation ethics. Many projects within the draft ESMP (Chambers Group, Inc., 1998) require education of both on-post and rotational military units to comply with the Endangered Species Act. The same is true of the protection of cultural resources (Chapter

13). Most Environmental Awareness materials include information relating to natural and cultural resources protection.

ITAM has implemented a series of educational briefings and handouts explaining sensitive resources on the Training Center, including the desert tortoise. Briefings are conducted by the Garrison Commander, Range Control, and a team from the Natural and Cultural Resources Section, usually consisting of one biologist and one archaeologist. Briefings cover restricted areas, off-limits areas, protected sites, and sensitive resources, including the desert tortoise and its habitat. The following educational programs are either in place or are scheduled for implementation:

- The Observer/Controller Academy has a 1-hour course on natural and cultural resources training at the NTC & Fort Irwin for all Academy personnel on post and rotational military police who escort troops along the Manix Tank Trail. The course includes a ½-hour audiovisual presentation on the desert tortoise. Specific procedural information is provided to all personnel via hand-outs and lectures explaining ways to deal with desert tortoises observed in the field.
- The OPFOR Academy is a monthly program for leaders and officers of the opposing forces, who are stationed at the installation. Materials provided in the OPFOR Academy include presentations, a handout on natural and cultural resources on post, and a take-home quiz to reinforce learning.
- The Leader/Trainer Program has a 30-minute course presented one to two times each month to approximately 85 visiting officers who will be responsible for coordinating training maneuvers against OPFOR during their rotation.
- All military and civilian personnel on post and all subcontractors working with potentially hazardous materials are required to receive a briefing on hazardous waste management protocol. This briefing includes a ½-hour presentation on cultural and natural resources (including the desert tortoise). Approximately 25 military and civilian personnel attend this class every other month.
- In addition to the above-mentioned briefings, a Rotational Unit Environmental Briefing Handbook is presented to all personnel attending these briefings.

11.1.1 Proposed Action

Goal 1. Educate military personnel and civilians associated with military training to minimize impacts to the land and resources to maintain and enhance training.

Objective 1. Revise the Leader's Handbook, Soldier's Field Card, posters, training CDS, and other environmental awareness materials to keep information current, using the following priorities (U.S. Army, National Training Center and Fort Irwin, 1997a):

- FY 99 - Develop, revise, and update maps and training materials and produce a training/environmental video for export to rotational troop units.
- FY 00 - Sustain training materials.

Objective 2. Develop an in-processing brief and a quarterly post brief to emphasize better integration of environmental concerns at the incoming soldier level as well as within the civilian employee sector to inform all users of the post as to the natural resources upon which the training success of the Training Center ultimately rests.

Objective 3. Provide briefings and educational materials to Training Center units, rotational units, and

particularly Army National Guard and Reserve Component units.

Objective 4. Schedule and budget ITAM Environment Awareness projects using updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a).

Objective 5. Periodically publish information booklets similar to the Rock Art booklet, which is a high quality publication that provides information on the background of rock art, its value, and ways to help preserve it.

Goal 2. Establish/maintain education and training programs and well-defined operational procedures to avoid injury or mortality of desert tortoises and other sensitive species during training and other activities.

Objective 1. Develop education programs that will increase awareness of the desert tortoise and its habitat among all personnel on the NTC & Fort Irwin.

Objective 2. Use established training avenues to increase awareness of requirements to protect sensitive species on the NTC & Fort Irwin.

Objective 3. Include enlisted personnel in the OPFOR Academy training program.

Objective 4. Develop brochures for venomous animal awareness and spring protection.

Objective 5. Develop a cooperative approach to species/habitat protection and continue to stress the importance of reporting.

11.1.2 Other Management Options

The ITAM Environmental Awareness program is not specifically required for legal compliance, but many materials and programs are directly related to protected natural or cultural resources, and the entire program is directed toward sustainment of the capability of the installation to support the military mission, as required by the Sikes Act. Thus, while there are many options for educating military users of the installation, the option to not educate these personnel is not viable. Materials used by the NTC & Fort Irwin are developed specifically for military personnel, based on experience on other military installations and Corps of Engineers laboratory studies of the effectiveness of these materials. It is questionable whether other materials and briefings could be developed with better cost/benefits.

Projects using education to protect sensitive species, particularly the desert tortoise, were developed in response to the Biological Opinion (USFWS, 1995) during development of the programmatic management plan (Chambers Group, Inc., 1996a) and the draft ESMP (Chambers Group, Inc., 1998). Thus, while there are options to specific methods used, the option to not use education is not viable, and changes in the program would likely require consultation with the USFWS.

11.2 Public Awareness

Use of Media

The NTC & Fort Irwin's weekly newspaper, the *Tiefort Telegraph*, is the most efficient way for natural resources personnel to access the NTC & Fort Irwin community. This newspaper is used to explain programs and gain support for their implementation. Articles target a wide range of readers but may be designed to appeal to specific categories of readers.

Natural resources and ITAM personnel often write articles for the *Tiefort Telegraph*, and staff writers also cover natural resources and ITAM programs. Examples of articles include the use of engineer units to support LRAM projects, desert tortoises, use of the Student Conservation Association, and scouts helping designate off-limits areas. The Natural and Cultural Resources Program Manager writes short "clips" which can be used as "fillers" for the paper (e.g., coyotes, badgers, etc.).

Other newspapers, such as the Victorville *Desert Dispatch* and *Daily Press*, use information about the Training Center's natural resources programs. Army publications, such as *The Environmental Update*, *The Bridge*, and the FORSCOM publication, *The Grapevine*, have published articles (e.g., soil stabilization, Seibert stakes, Environmental Awareness program, etc.) for dissemination to other military installations. News releases and interviews with outside media are coordinated with the Public Affairs Office.

The NTC & Fort Irwin's natural resources program is seldom the subject of local television or radio coverage. However, it has been featured on some national television. In 1990 the Nova series aired a program on the desert tortoise at the installation. The Discovery Channel recently announced its intent to do a program on modern warfare and natural resources management at the Training Center.

The media is important to the dissemination of information regarding tortoise management and protection. Information provided by the Public Affairs Office provides timely newspaper articles and spots on base television and radio stations to installation personnel and the public.

Field Trips

The NTC & Fort Irwin provides opportunities for the public to learn about the desert tortoise and other items of interest through participation in programs such as the Desert Explorers. Desert Explorer field trips, which are led by personnel from the Natural and Cultural Resources Section, cover topics including cultural resources, geology, endangered and threatened species, and the natural history of plants and animals of the Mojave Desert.

Special Events

The NTC & Fort Irwin natural resources and ITAM personnel go to considerable efforts to spread the word regarding their programs using special events. Below is a partial listing of recent examples:

- Earth Day talks at civic clubs and schools,
- local Chamber of Commerce meeting presentations, and
- environmental displays at the Barstow Military Appreciation Day, Edwards AFB open house,

Barstow Earth Day, Torrance for Armed Forces Appreciation Day, and Fort Irwin Earth Day.

Youth Programs

Youth groups are involved in various natural resources programs on the NTC & Fort Irwin. Scouts use post projects for their conservation badges. Both Boy Scouts and Cub Scouts have assisted with the construction of Seibert stakes and planting of native vegetation for the ITAM program. Natural resources personnel provide lectures and guided field trips for youth groups, when requested.

Once or twice a year, a biologist from the Natural and Cultural Resources Section assists in educating children on post by visiting the Fort Irwin Elementary School to provide information and class lectures on the natural history and ecology of the desert tortoise. This includes a hands-on session where tortoise shells and live tortoises (adopted due to illness) are displayed.

Desert Tortoise Education Facility

The installation constructed a Desert Tortoise Education Facility in the middle of the cantonment area at Jackrabbit Park. Captive desert tortoises are residents of the facility and can be observed by base personnel and visitors. Typically, tortoises in the facility are captives that have been brought to the post veterinarian by base personnel or tortoises that have been injured on- or off-post and cannot be returned to the wild.

11.2.1 Proposed Action

Goal 1. Provide an understanding of the NTC & Fort Irwin natural resources program to installation and surrounding communities.

Goal 2. Provide information to soldiers, civilian employees, and other installation users to improve their understanding of impacts of their activities on the environment.

Objective 1. Use the printed media, both on- and off-post, as an important part of natural resources management on the NTC & Fort Irwin.

Objective 2. After coordination with the Public Affairs Office, provide support to the electronic media in preparation of television or radio programs involving natural resources on the Training Center.

Objective 3. Whenever personnel are available, provide tours of the NTC & Fort Irwin to interested groups, such as the Desert Explorers.

Objective 4. Continue to participate in local events with natural resources significance, particularly those associated with Earth Day and appreciation of the armed forces.

Objective 5. Work with youth groups whenever possible as a good investment in the future.

Objective 6. Maintain and enhance educational opportunities at the Desert Tortoise Education Facility.

Objective 7. Provide a "visitor-activated" audio description of the tortoise life cycle and other information for the Desert Tortoise Education Facility.

11.2.2 Other Management Options

With exception of efforts directed specifically toward public education regarding the desert tortoise, none of the above projects are mandated by law. Major reductions in tortoise education programs would likely require consultation with the USFWS. Other programs could be reduced or expanded to any degree desired. Army policies and programs preclude total public awareness elimination, but the degree of participation from ITAM and natural resources personnel is optional. Personnel constraints in both programs largely restrict the option to significantly increase public awareness activities.

11.3 Professional Enhancement

Natural resources management on the NTC & Fort Irwin is involved with other professionals on other military installations and neighboring public lands. As a part of overall professional enhancement, natural resources and ITAM personnel on the Training Center provide information to others who may be interested in learning from experiences on the installation. For example, personnel have made presentations to other Defense natural resources managers at the Annual ITAM Workshop, and in 1996 and 1997 the installation sponsored 3-day Mojave Desert Research Symposia. These symposia featured presentations from a wide spectrum of scientists, including biologists, geologists, botanists, meteorologists, GIS managers, archeologists, etc.

11.3.1 Proposed Action

Goal. Sponsor and participate in opportunities to provide information regarding NTC & Fort Irwin natural resources programs and similar programs elsewhere.

Objective 1. Consider sponsoring other Mojave Desert Research Symposia or similar events, depending on available resources.

Objective 2. Actively participate in training sessions, such as the annual ITAM Workshop (see Section 16.2.2).

Objective 3. Author/co-author papers for scientific journals presenting research/project results.

11.3.2 Other Management Options

None of the above projects are mandated by law. Thus, they can be reduced or expanded to any degree desired. Army policies promote the involvement of natural resources personnel with other professionals, but the degree of participation from ITAM and natural resources personnel is optional. Personnel and budget constraints will limit significant increases in the time and money spent on these programs.

12.0 OUTDOOR RECREATION

Outdoor recreation enhances the quality of life for military and civilian personnel. As such, Army lands with suitable natural resources are to be managed to allow outdoor recreational opportunities, consistent with the Sikes Act. For the purposes of this INRMP and to be consistent with DoD Directive 7400.4 and AR 200-3, outdoor recreation is defined as recreational programs, activities, or opportunities that depend on the natural environment. Examples include hunting, horseback riding, picnicking, bird watching, off-road vehicle use, hiking, and camping. Developed or constructed facilities and activities such as golf, tennis courts, baseball facilities, etc. are not included.

General Goal 1. Provide opportunities for the NTC & Fort Irwin community to participate in high quality, safe outdoor recreation.

General Goal 2. Manage outdoor recreation consistent with needs of the NTC & Fort Irwin military mission.

General Goal 3. Integrate recreation activities with natural resources stewardship and compliance.

12.1 Military Mission Considerations

The military mission has priority over outdoor recreation involving range access. If outdoor recreational activities are to continue to thrive on the NTC & Fort Irwin, this military mission priority must not be compromised. If recreational or management activities conflict with military activities, the military mission comes first.

12.2 Public Access

General public access is not permitted on the NTC & Fort Irwin, except under highly controlled conditions. The military mission is extremely hazardous, and there are significant dangers associated with range use on the installation. Security requirements are high. An example of public use of the installation is guided tours, which can be closely controlled to maintain visitor safety and prevent conflicts with the military mission.

Department of Defense Directive 4715.3, *Environmental Conservation Program*, May 3, 1996, states, "The principal purpose of DoD lands and waters is to support mission-related activities. Those lands and waters shall be made available to the public for educational or recreational use of natural and cultural resources when such access is compatible with military mission activities, ecosystem sustainability, and other considerations such as security, safety, and fiscal soundness. Opportunities for such access shall be equitably and impartially allocated".

Paragraph 2-10 of Army Regulation 200-3, *Natural Resources -- Land, Forest, and Wildlife Management*, states that access by recreational users, ... will be within manageable quotas, subject to safety, military security, threatened or endangered species restrictions, and the capability of the natural resources to support such use; and at such times as such access can be granted without bona fide impairment of the military mission, as determined by the installation commander. This regulation further states that withholding public access must be substantiated by a statement in the INRMP. The NTC & Fort Irwin

policies toward public access are within Army and Defense policies.

12.2.1 Proposed Action

Goal. Provide highly controlled access to the NTC & Fort Irwin for natural resources recreation, in accordance with Army policies.

Objective. Continue NTC & Fort Irwin policies toward public access.

12.2.2 Other Management Options

It is difficult to increase access opportunities within the constraints of the current military mission, which is very land-use extensive, range scheduling exclusive, and inherently dangerous to nonmilitary users. There is the option to tighten recreational access policies, but unless either the mission or the threat assessment associated with access changes, this would have to be substantiated with signatory agencies of this INRMP.

12.3 Hunting and Fishing

There are no fisheries capable of supporting recreational fishing on the NTC & Fort Irwin. Hunting is controlled via NTC Reg. 420-3. Small game species at the installation include Gambel's quail, chukars, cottontail rabbits, and jackrabbits. Migratory game species, particularly mourning doves, ducks, and geese, pass through the installation during spring and fall migrations. Ducks and geese are not hunted on the installation. Coyotes also may be hunted.

Hunting is conducted under regulations promulgated by the CDFG. Hunters are required to possess a State hunting license and must abide by State (and federal with regard to migratory species) regulations regarding firearms, hunter safety requirements, hunting seasons, and bag limits.

The role of the Provost Marshal in the control of hunting on the NTC & Fort Irwin is outlined in Chapter 10. The G-3 (Range Control) is responsible for the following actions:

- advance designation of range areas open to hunting;
- designation of restrictions, including areas open, hours open, and hunter quotas;
- administrative processes to control hunters, including issuing access passes and ensuring hunters have installation hunting permits and firearms registration certificates; and
- coordination with the Provost Marshal to control unauthorized entry into restricted areas and accounting for delinquent (possibly lost) hunters.

The Director of Public Works (Natural and Cultural Resources Section) is responsible for the following actions:

- development and implementation of wildlife management plans that include game species (*i.e.*, this INRMP), in coordination with the CDFG and USFWS;
- conducting surveys to monitor impacts of hunting on game species;
- control of predators and nuisance animals;
- assistance to the Provost Marshall for enforcement of game regulations;

- administration of the penalty and suspension system of NTC Reg. 420-3; and
- advising the Natural Resources Conservation and Beautification Committee on technical aspects of the hunting program.

12.3.1 Proposed Action

Goal. Provide quality hunting opportunities on the NTC & Fort Irwin, consistent with requirements to avoid conflicts with the military mission and provide for safe hunting conditions.

Objective 1. Implement provisions within NTC Reg. 420-3.

Objective 2. Implement surveys to monitor impacts of hunting.

12.3.2 Other Management Options

Additional hunting in terms of more lands and more access times is not consistent with the conduct of the military mission and, thus, is not a viable option. Reduced hunting, to include no hunting, is an option. However, changes in the hunting policy would have to be coordinated with the CDFG via changes to this INRMP, per the Sikes Act and AR 200-3. Changes in the system of controlling hunters are possible but only if security, safety, and non-conflict with the military mission are maintained.

12.4 Other Natural Resources Oriented Outdoor Recreation

The NTC & Fort Irwin has natural resources-related recreational activities other than hunting. These range from more passive activities such as picnicking, wildlife watching, and nature photography to more active recreational outlets such as bicycling, horseback riding, recreational shooting, and camping. These activities are generally a responsibility of the DCA, which uses the base operations contract for program implementation.

12.4.1 Specific Activities

High Desert Equestrian Club

The High Desert Equestrian Club is a private organization open to all members of the Fort Irwin community. The club operates a 32-stall stable located in the western section of the cantonment area, off Goldstone Road, across the street from the Rod and Gun Club shooting range. Horses are privately owned and maintained by individual owners, who are also expected to maintain the stalls. No staff or offices are located at the stables. Horseback riding is allowed at locations designated by Range Control. The boundaries for horseback riding areas can be found in NTC Reg. 350-3 (U.S. Army, NTC & Fort Irwin, 1996). Equestrians are free to ride within designated areas at their discretion. The club must also follow the policy guidance for private organizations as listed in NTC Pamphlet 210-1.

Off-Highway Vehicles

An Off-Highway Vehicle area is currently under review. The proposed area is at the intersection of Fort Irwin Road and NASA Road. The area is approximately 6 square kilometers and will be fenced with both

desert tortoise proof fence and two-strand barbed wire. We expect approval from USFWS in FY 01.

Camping and Picnicking

Picnicking is a popular activity on the NTC & Fort Irwin. Picnic facilities are at Jackrabbit Park, Constitution Park, the Pavilion, and small areas near playgrounds and other areas.

There are 13 recreational vehicle hook-up spaces in the cantonment area for use by military and civilian personnel and their dependents. Electricity is the only utility supplied to the area; there are no water or sewer hook-ups at the park. Spaces are available with a per-day charge. Primary users of the recreational vehicle park are contractors performing long-term work on the installation.

Desert Explorers Club

The Desert Explorers Club is an organization on the installation, open to all members of the Fort Irwin community: military, civilian, dependents, support personnel, and visitors. As an educational organization, the Desert Explorers facilitate stewardship of the natural environment and areas of cultural and/or historical significance by increasing understanding and appreciation of the Mojave Desert ecosystem on the Training Center. Activities include hikes and day trips on and off the installation, meetings, and an occasional speaker on the desert environment. Activities are planned, announced, and open to anyone. The Natural and Cultural Resources Section has an active partnership with the Desert Explorers Club to facilitate awareness programs (Section 11.2).

The Sportsman Club

The Sportsman Club is a private organization on the NTC & Fort Irwin, open to all members of the Fort Irwin community: military, civilian, dependents, support personnel, and visitors. The club operates rifle, pistol, and archery ranges located in the western section of the cantonment area, off Goldstone Road. The shooting range has been located to avoid disruptions with the training activity of the Training Center and is open from sunrise to sunset. Proper firearm safety procedures are to be followed at all times. The organization must follow policy guidance for private organizations as listed in NTC Pamphlet 210-1.

Skeet and Trap Range

The skeet and trap range (Range 8) is controlled by Range Control and operated by DCA Staff. When Range 8 is open, firing ranges operated by the Sportsman Gun Club are closed due to firing fans. In 1998 construction began on a \$90,000 upgrade of this complex.

Recreational Equipment Issue Center

DCA operates a major outdoor recreation equipment issue center. Items issued include fishing equipment, camping equipment, boats and motors, canoes, camping trailers, etc. The Center provides boating safety classes, and it arranges for special training, such as scuba classes. The Center provides taped instruction on such varied activities as golf, camping, and desert survival. The Center offers a wide variety of off-post tours and recreational outings (e.g., rock climbing, rafting, skiing, deep seas fishing) using a commercial vendor. These tours and outings are scheduled at least 14 times per month.

Golf

The NTC & Fort Irwin formerly had a nine-hole golf course and small driving range in the cantonment area that had been closed for some time. In 1998 the installation converted the driving range into a pitch and putt, six-hole golf facility. The facility is watered with secondarily treated water from the wastewater treatment plant.

12.4.1.1 Proposed Action

Goal. Provide quality opportunities for natural resources-based outdoor recreation.

Objective 1. Continue and enhance opportunities for outdoor recreation involving natural resources at the Training Center.

Objective 2. Evaluate proposals for a new location for the Riding Stable, which could have significant impacts on natural resources management, depending on the selected site.

Objective 3. Develop recreational vehicle sites to include full hookups, a comfort station, picnic area, and other amenities, using appropriate NEPA documentation, by 2000.

12.4.1.2 Other Management Options

There are many options available for outdoor recreation, but they must be consistent with the accomplishment of the military mission to be viable. They must also be consistent with the ecosystem management strategy employed to protect and use natural resources as well as overall goals for outdoor recreation on the military installation. The program could be decreased or expanded to whatever level can be supported by the NTC & Fort Irwin.

12.5 Indoor Recreation

The cantonment area is the primary housing and recreation area on the installation. Numerous recreational activities and facilities are available for military and civilian personnel and their dependents. Activities and facilities include a movie theater, bowling alley, baseball and soccer fields, basketball and racquetball courts, pools, a jogging and confidence course, outdoor skate park, a 4 plex (softball), and 12 parks. During non-rotational periods, many of these facilities are unused.

The NTC & Fort Irwin has constructed a Desert Tortoise Education Facility in the center of the cantonment area. Here, soldiers, family members, and visitors can see captive desert tortoises. See Section 11.2.1 for more information on this facility.

13.0 CULTURAL RESOURCES PROTECTION

Cultural resources management at the NTC & Fort Irwin is provided in accordance with Section 106 and Section 110 of the National Historic Preservation Act (NHPA) (16 U.S.C. Section 470, as amended), the Archeological Resources Protection Act (16 U.S.C. Section 470aa-47011), the American Indian Religious Freedom Act (42 U.S.C.), the Native American Graves Protection and Repatriation Act (25 U.S.C. Section 3001 *et seq.*), Executive Order 11593 (*Protection and Enhancement of Cultural Environment*), DoD Directive 4710.1 (*Archeological and Historic Resources Management*, 1984), and AR 200-4 (*Cultural Resources Management*).

Management of the NTC & Fort Irwin's cultural resources is a mission of the Environmental Division, DPW, which has a full-time Cultural Resource Manager (CRM) who is responsible for all aspects of cultural resources management, including coordination with the California State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation, Native American tribal organizations, and the public. The installation has a *Ft. Irwin Integrated Cultural Resources Management Plan* (SAIC, 1998), and much of the below discussion is taken from this plan.

There are four major goals of the NTC & Fort Irwin Cultural Resources Program (SAIC, 1998):

- Manage cultural resources in the context of freedom to use open space in an unrestricted manner wherever feasible.
- Reiterate and update guidelines, standards, and management practices for cultural resources proposed in a draft final *Fort Irwin Historic Preservation Plan* (Dean, 1986), which was not implemented.
- Set priorities for survey, evaluation, and treatment projects based on the sensitivity of cultural resources to impacts from Army activities and the likelihood that those impacts would occur in the foreseeable future.
- Recommend ways that Native Americans might participate in the overall historic preservation program.

This INRMP has a more limited cultural resources goal than the complete Cultural Resources Program, but it is compatible with cultural resources program goals.

13.1 Cultural Resources

13.1.1 Cultural Resources Inventory

Within the boundaries of the NTC & Fort Irwin there are a large number of archaeological and historical sites and districts. A wide range of site types are represented: prehistoric habitation and resource procurement sites (dating back at least 12,000 years); Native American rock art sites (petroglyphs); historic period Euro-American habitation sites, mines, trails, and other sites (including military training facilities); and the Pioneer Deep Space Antenna built for NASA in 1958 and registered as a National Historic Landmark in 1985.

To date, 65% of the installation has been surveyed for archaeological sites. Survey efforts have largely been

conducted in areas which are likely to contain sites (such as former lake margins and springs). These surveys have identified roughly 700 prehistoric archaeological sites. The survey effort is on-going with new areas surveyed each year. For example, in 1997 a 9-square kilometer survey was conducted along the southern portion of the installation.

The goal of the cultural resources survey is to inventory sites on the installation, to evaluate those sites for significance, and to nominate sites that meet significance criteria to the National Register of Historic Places (NRHP), established by the NHPA. Three sites are listed on the NRHP (Bitter Springs, Cave Springs, and the Pioneer Deep Space Antenna). Twenty-four others have been determined eligible but are not yet registered. In addition, three historic districts (Drinkwater Spring, No-Name Basin West, and Nelson Lake) have been determined eligible for the NRHP. Many other sites are considered eligible for the NRHP but have not yet been formally designated as such.

A recent survey of standing architectural resources in the Cantonment Area and the Pioneer Deep Space Station Site found that only three standing structures were considered eligible for the NRHP. All three structures are located at the Pioneer Site in the Goldstone Deep Space Communications Complex. While the management of these structures is the responsibility of the NTC & Fort Irwin, the Pioneer area is "off limits" and, thus, should not be directly impacted by Army training. However, the Pioneer Site is immediately adjacent to training areas and is subjected to frequent unauthorized visits and occasional acts of vandalism. While no other historic or architectural structures are currently identified as eligible for the NRHP, in the future some structures may become more significant and warrant protection.

Eligibility of archeological sites for inclusion in the NRHP is the principal criteria determining management prescriptions. Generally, sites fall into one of three categories with regard to NRHP eligibility:

- **Eligible:** These sites have been determined eligible for the NRHP and therefore are subject to protection. They should not be affected without consultation per Section 106 of the NHPA and development of a plan to mitigate adverse effects.
- **Ineligible:** These sites have been determined ineligible for the NRHP and do not require protection from adverse effects.
- **Potentially eligible (intermediate):** Further investigation is required to determine NRHP eligibility. Therefore, these sites are potentially eligible for the NRHP and require protection until determinations of eligibility can be made.

13.1.2 Planning

The level of survey intensity has been highly variable across the installation (Basgall and Hall, 1994). Most cultural studies at the Training Center were conducted after initial disturbances and in conjunction with ongoing land-use practices. As such, sampling strategies have not been systematic, making quantitative comparisons difficult in most circumstances.

Initial management priorities for cultural resources known or expected to exist on the NTC & Fort Irwin are established according to three main criteria: (1) threats to archaeological sites from ongoing or anticipated training activities; (2) evaluation of existing inventory levels and assessment of future needs; and (3) appraisal of the need for further evaluation and/or mitigation at known or newly identified resources (Basgall and Hall, 1994). Once installation-wide inventory levels are deemed adequate, management efforts can shift

to monitoring and mitigating specific impacts on a known set of resources. As such, the direction of management efforts at the installation should be seen as a transition from exploratory identification, evaluation, and treatment of resources spread across the Training Center to a state in which a smaller, established set of sites and localities is monitored and treated in accordance with changing training requirements. All archaeological sites are being recorded in the Training Center's GIS to facilitate management of these resources.

13.1.3 Relationships with the Military Mission

Archaeological resources within the installation are frequently located in areas which are suitable for training. This has resulted in widespread site destruction and damage, particularly around former lake margins and basins (playas). In many cases, destroyed and damaged sites had been previously cleared for training as they were sufficiently studied before their destruction. Much of this destruction occurred in previous decades during military training exercises. Currently, efforts are made to protect known sites as well as unsurveyed areas within the installation. Whenever possible, sites which are on the NRHP or are considered eligible for the NRHP are protected by "off-limits" signs and fencing. These areas are monitored by Cultural Resources Program personnel and Range Control.

In addition to survey and inventory of sites on the installation, another primary goal of the Cultural Resource Program is to mitigate additional sites for unrestricted use by the Training Center. Mitigation involves large-scale data recovery (surface collection and excavation) at archaeological or historic sites. Artifacts and other items collected in mitigation projects are curated at the NTC & Fort Irwin. Numerous archaeological mitigations have been conducted, and additional mitigations will be conducted as funding becomes available.

13.1.4 Consultation with Native Americans

Various laws and regulations require the NTC & Fort Irwin to consult with Native Americans regarding Army activities on sites within the installation. The NHPA requires that federal agencies must consult with the Advisory Council on Historic Preservation regarding any proposed action that has the potential to affect a property on or eligible for the NRHP. This includes consultation with the SHPO and interested parties, including but not limited to Native Americans.

The Archaeological Resources Protection Act (ARPA) requires that archaeological resources on public and Indian lands be protected. This includes notifying Indian tribes, in advance, of possible harm to sites with religious or cultural importance.

The Native American Graves Protection and Repatriation Act (NAGPRA) protects the ownership and control of native American human remains and related cultural items excavated or discovered on federal lands. If human remains are discovered during projects, work must stop, and a reasonable effort must be made to protect the discovery. Appropriate Native American groups must be notified, and requirements of Section 106 of NHPA and NAGPRA must be followed for excavation and disposition of the remains. NAGPRA also requires a 30-day delay period after the discovery of human remains before project work in the area of the discovery can resume. Work may resume earlier if consultation and agreement occur.

The American Indian Religious Freedom Act covers the protection of intangible, ceremonial, or traditional values and concerns not tied to specific cultural properties. The NTC & Fort Irwin must establish contact with interested Native American groups during the regular course of the NHPA Section 106 process.

Executive Order 13007 (*Indian Sacred Sites*) stipulates that if a federally recognized tribe or representative of an Indian religion identifies a sacred site on the NTC & Fort Irwin, the installation commander must enter into consultation with that group or individual to provide access to and ceremonial use of the site and avoid adversely affecting the physical integrity of such sites.

13.2 Natural Resources Management Implications

Natural resources management on the NTC & Fort Irwin has little potential to affect cultural resources. Conversely cultural resources management on the post seldom significantly affects natural resources management. In the case of site mitigation, the natural resources staff will survey the area for threatened and/or endangered species. If a federally listed species is encountered, a Section 7 consultation with USFWS will be requested, and upon approval of USFWS, the species will be relocated and mitigation will continue. If no listed species are encountered, site mitigation can continue. Upon completion of the site mitigation, the site will be restored to as close to its natural condition as possible.

Archaeological mitigations conducted at the Training Center have recovered a substantial database of prehistoric and early historic environmental conditions. Faunal and botanical data reveal changes in climate, biodiversity, and habitat through time. These resources may be instrumental in assessing long-term effects of land-use at the installation, as well as long-term climate change.

Natural resources practices with potential to adversely affect cultural resources are outlined below.

- **Land Rehabilitation and Maintenance/erosion control:** Of all practices associated with natural resources management on the NTC & Fort Irwin, LRAM/erosion control projects have perhaps the greatest potential to affect archeological sites. Projects involving decompaction, earth moving, and fill deposition can damage or bury archeological sites. Generally, however, effects to archeological sites from reduced erosion are positive. In addition, surveys are done in project areas prior to initiation of work.
- **Outdoor recreation programs:** Public access associated with hunting and outdoor recreation activities has limited potential to increase the risk of vandalism to archeological sites.
- **Spring maintenance/exotic plant species control:** Care must be taken to minimize ground disturbance when working around springs that are highly likely to contain archeological resources. Projects such as fence building, spring development, and exotic plant removal have potential to disturb or damage archeological sites.

Even with proper review, natural resources projects still have potential to affect archeological sites through accidental discovery.

Natural resources management can be used to protect cultural resources sites. Seibert stakes (Section 9.8.1.4) are used to keep military activity from damaging sites. LRAM projects (Section 9.8.1.1) can be planned to specifically protect sites from erosion, and LRAM, in general protects both known and unknown sites downslope.

Numerous provisions of this INRMP benefit cultural resources management on the NTC & Fort Irwin. These include *Special Interest Area Protection* (Section 9.12), *Military Personnel Awareness* (Section

11.1), *Land Rehabilitation and Maintenance* (Section 9.8), *Enforcement* (Chapter 10), and *NEPA Implementation* (Chapter 14).

13.2.1 Proposed Action

Goal. Implement this INRMP in a manner consistent with the protection of cultural resources at the NTC & Fort Irwin.

Objective 1. Implement provisions of the Integrated Cultural Resources Management Plan that relate to natural resources management.

Objective 2. Consider natural resources projects when planning cultural resources surveys, and use results of cultural resources surveys to plan natural resources projects.

Objective 3. Conduct listed species surveys and, if required, consultation for proposed cultural resources mitigation sites.

Objective 4. Avoid or mitigate adverse effects to cultural resources from natural resources through proper review and planning. Submit proposed projects, as part of NEPA review, to the CRM for approval, determinations of effect, and Section 106 consultation, as necessary.

Objective 5. Maximize use of GIS archeological information in planning and implementing LRAM projects.

Objective 6. Take the following protective measures upon discovery of sites.

- Cease ground disturbing activities immediately and report to the CRM upon discovery of potential cultural deposits.
- Consider alternatives for moving the project to another location.
- If remains are determined by the CRM to be natural, do no further investigation and resume the project. Protect the site until such time that it is determined ineligible for the NRHP if remains are determined to be cultural.

Objective 7. Use natural resources techniques and projects to protect cultural resources sites.

13.2.2 Other Management Options

There are few viable options with regard to protection of cultural resources during implementation of this INRMP. Laws and regulations require surveys and protection or mitigation of significant cultural resources sites on federal lands. Procedures are detailed, and the proposed action follows these procedures. Deviations from the proposed action would require, at a minimum, consultation with the SHPO.

The use of natural resources to protect cultural resources has options in terms of scope of these projects. The potential to protect sites using active erosion control and site marking is almost unlimited. Thus, the number of projects could be increased or decreased.

14.0 NATIONAL ENVIRONMENTAL POLICY ACT IMPLEMENTATION

The National Environmental Policy Act (NEPA) was created to disclose environmental concerns with human activities and resolve them to the best degree possible. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. NEPA regulations (AR 200-2, *Environmental Effects of Army Actions*) require mitigation or full disclosure of damage to the environment. NEPA was not legislated to stop actions. Rather, it was crafted to identify environmental problems, providing an opportunity to resolve them using planning at early stages of project development.

The NTC & Fort Irwin must also comply with the California Environmental Quality Act, a state law requiring public agency decision-makers to document and consider the environmental implications of their actions. CEQA applies to all government agencies in California, including the NTC & Fort Irwin. CEQA contains substantive provisions requiring agencies to deny approval of a project with significant adverse effects when feasible alternatives or feasible mitigation measures can substantially lessen such effects.

14.1 Responsibilities and Implementation

14.1.1 Responsibility

The Environmental Division, DPW has primary responsibility for NEPA implementation at the NTC & Fort Irwin. One person is assigned NEPA as an additional duty. The process of reviewing and preparing NEPA documentation often involves direct coordination with other natural resources partners, particularly those listed in Chapter 5 of this INRMP.

14.1.2 NEPA Documentation

The most common NEPA document prepared for projects which do not impact natural/cultural resources or the environment is a Categorical Exclusion, often with an attached Record of Environmental Consideration. This simple documentation generally works well for routine projects, such as borrow sites, small digging projects, and similar projects where natural or cultural sites are not damaged.

Environmental Assessments (EA) are required when the screening criteria for a categorical exclusion are not met. This often happens when a new military exercise or range is planned, when the action involves a wide geographic area, or when wetlands or other sensitive plant communities may be involved. Examples include new military missions, projects which may affect threatened or endangered species or cultural resources, major plans (such as this INRMP), or range construction. EAs require the Commander's approval, publishing a Finding of No Significant Impact (FONSI), and waiting 30 days for public comment.

If a FONSI is not appropriate, the following options are available:

- Modify the action to remove significant impacts.
- Mitigate significant adverse impacts.
- Drop the action.
- Publish a Notice of Intent to prepare an Environmental Impact Statement.

The NTC & Fort Irwin has no NEPA documentation for the natural resources program as a whole. This INRMP/EA fulfills that requirement.

14.1.3 Mitigation

Mitigation is an excellent way to either consider less damaging options or provide means to off-set damage to the environment and should be considered throughout the NEPA process. Below are five general mitigation tactics:

Avoidance: Avoid adverse impacts on natural resources by not performing activities that would result in such impacts. Confine construction to areas where no significant impacts would occur to natural resources.

Limitation of action: Reduce the extent of an impact by limiting the degree or magnitude of the action. Minimize impacts of construction projects by arranging timing, location, and magnitude of actions so that they have the least impact on natural resources.

Restoration of the environment: Restore the environment to its previous condition or better. This could involve reseeding and/or replanting an area with native plants after it has been damaged by construction projects.

Preservation and maintenance operations: Design the action to reduce adverse environmental effects. This could involve actions such as monitoring and controlling pollution, contamination, disturbance, or erosion caused by construction projects that would impact natural resources.

Replacement: Replace the resource or environment that will be impacted by construction projects. Replacement can occur in-kind or otherwise, on-site or at another location. This could involve creation of the same type or better quality habitat for a particular impacted wildlife species or creation of habitat for another species.

Mitigation that is identified in a FONSI is a Class 1 "must fund" for environmental purposes. This provides a reliable mechanism to fund mitigation included in NEPA documents.

14.2 NEPA and Natural Resources Management

The Environmental Division uses NEPA to ensure its activities (as described in this INRMP) are properly planned, coordinated, and documented. The Division also uses NEPA to identify problems associated with other organizations' projects which affect NTC & Fort Irwin natural resources when it reviews such projects.

Siting range-related projects is perhaps the most basic decision which requires input from natural resources personnel. If this phase is done within the cooperative spirit of NEPA, most other environmental problems are generally resolved with relative ease. Decisions such as specific siting or mission planning should be cooperatively discussed prior to preparing NEPA draft documents. The use of the Training Requirements Integration component of ITAM (Section 9.13) may help in this process.

An important offshoot of proper NEPA implementation is that projects are often enhanced by the effort.

Siting is one of the most common examples of project enhancement. When natural resources managers understand mission/project requirements in terms of land features and requirements, they often not only offer more potential site options to mission or project planners but also offer alternatives to avoid future environmental conflicts.

14.2.1 Proposed Action

Goal 1. Use NEPA to identify projects and activities on the NTC & Fort Irwin which might impact natural resources and work with project planners to resolve issues early in the planning process.

Goal 2. Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA.

Goal 3. Help the NTC & Fort Irwin comply with NEPA.

Objective 1. Document effects of implementation of this INRMP through an EA that is embedded in this document.

Objective 2. Reference this INRMP/EA in descriptions of affected environment to reduce verbiage in other NEPA documents.

Objective 3. Classify mitigation as a "must fund" for budgetary purposes.

Objective 4. Conduct an informational brief on NEPA purpose and process for appropriate command level personnel to inform them of the benefits, requirements, and importance of NEPA.

14.2.2 Other Management Options

There are few viable options with regard to NEPA documentation with regard to this INRMP. Laws and regulations require the use of NEPA, and the Department of Army specifically requires an EA for INRMPs. Procedures are detailed, and the proposed action follows these procedures. The NTC & Fort Irwin could have chosen to prepare a separate Environmental Assessment for this INRMP rather than a combined document. However, this would not have changed the outcome of the analysis.

This EA could have been prepared only considering the preparation of the INRMP, which would require individual NEPA documentation for each project as it is implemented. This option would be far more costly. The option to not prepare NEPA documentation for natural resources projects is not legally viable. The option to prepare an Environmental Impact Statement was viable, but there was no reason to assume that one would be required.

15.0 UNRESOLVED ISSUES

The NTC & Fort Irwin faces many tough issues, but they are not unresolved in terms of plans to deal with them. This INRMP includes projects designed to either complete or move toward completion of issues that confront natural resources management on the Training Center. Many projects described in this INRMP could benefit from increased funding and personnel support.

The only significant unresolved issue involving natural resources at the NTC & Fort Irwin is the land expansion issue. However, by definition, this INRMP does not include lands that do not belong to the Training Center. When final decisions are made regarding land expansion, this INRMP will be adjusted as needed to include programs and projects for any new lands.

16.0 IMPLEMENTATION

This plan is only as good as the NTC & Fort Irwin capability to implement it. This INRMP was prepared with a goal of 100% implementation. Below are described the organization, personnel, and funding needed to implement programs described in chapters 8 through 14.

16.1 Organization

The Environmental Division, DPW and the ITAM Office, G3-Training at the NTC & Fort Irwin can implement most of this INRMP and fulfill general goals and policies established in Chapter 1 and more specific goals and objectives within chapters 8-16. Other Training Center organizations identified in Section 5.1 are also capable of implementing their portions of this INRMP with no organizational changes, although they may elect to make changes during 1999-2003 for improved operations efficiency.

16.2 Personnel

*"The management and conservation of natural and cultural resources under DoD control, including planning, implementation, and enforcement functions, are inherently governmental functions that shall not be contracted."*¹¹

16.2.1 Staffing

The following staffing is required to implement this INRMP at the NTC & Fort Irwin:

Directorate of Public Works

| | | |
|--|---|--------------------|
| Natural and Cultural Resources Program Manager | 1 | GS-12 |
| Ecologist | 1 | GS-12 |
| Botanist | 1 | GS-11 |
| Biologist/NEPA Coordinator | 1 | GS-11 |
| Biologist | 2 | ORISE positions |
| Cultural Resources Manager | 1 | Contract position |
| Archeology Technician | 2 | Contract positions |
| Archeology Technician | 1 | ORISE position |

Mojave Desert Ecosystem Program

| | | |
|------------------------------|---|-------------------|
| DoD Coordinator/Program Lead | 1 | Contract position |
| Administrative Assistant | 1 | Contract position |
| GIS Manager | 1 | Contract position |
| Web Master | 1 | Contract position |
| Software Specialist | 1 | Contract position |

¹¹ DoD Instruction 4715.3, Environmental Conservation Program, 2 May 96.

G3 Training

| | | |
|---------------------|---|--------------------|
| ITAM Manager | 1 | Contract position |
| Project Coordinator | 1 | Contract position |
| LRAM Coordinator | 1 | Contract position |
| LCTA Coordinator | 1 | Contract position |
| GIS Manager | 1 | Contract position |
| Field Crew | 4 | Contract positions |

Above personnel lists do not include personnel within DCA or the Provost Marshal's Office.

16.2.1.1 Proposed Action

Goal. Provide staffing of natural resource management professionals required to effectively manage natural resources on the NTC & Fort Irwin (Department of Army, 1995).

Objective. Provide staffing for the NTC & Fort Irwin natural resources program as indicated in the above discussion.

16.2.1.2 Other Management Options

The above staffing plan is not excessive in terms of staffing at comparable military installations in the nation. Other management options range from zero to much larger staffing. Staffing at significantly lower levels than listed above would undoubtedly lead to noncompliance with federal laws and regulations. Thus, this is not a viable option. Staffing at higher levels would increase the scope and quality of natural resources management on the Training Center with impacts as discussed in Other Management Options sections throughout this INRMP.

16.2.2 Personnel Training

The NTC & Fort Irwin natural resources organizations have a goal to continuously improve the success of natural resources management activities through professional development and information exchange. This will be accomplished by:

- maintaining staff knowledge of management strategies at the current state of the art through training and participation in or hosting workshops, research presentations, and other activities of regional and national professional natural resources research and conservation programs; and
- sharing information with natural resources experts to ensure maximum benefits of adaptive management and research efforts.

The NTC & Fort Irwin plans to send one or more persons to each of the following annual workshops or professional conferences:

ITAM annual workshop
National Military Fish and Wildlife Association annual workshop
North American Natural Resources Conference

Desert tortoise handling class
The Wildlife Society Conference
Desert tortoise management oversight group meetings
FORSCOM training sessions
Meetings of regional initiatives

Other conferences/workshops will be evaluated for their usefulness, and decisions will be made based on appropriateness to ongoing projects and funding availability. Projects which are especially useful include ecosystem restoration workshops, global position system training, GIS training in ArcView, advanced GIS training, endangered species training, and BLM-sponsored Archeological Resources Protection Act enforcement workshops.

The Wildlife Society and National Military Fish and Wildlife Association are among the professional societies applicable to meeting the needs of the NTC & Fort Irwin natural resources managers. Membership in these societies is encouraged. They have some of the best scientific publications in their professions, and literature review is a necessary commitment to maintain standards. Attending meetings of these societies provides excellent opportunities to communicate with fellow professionals as well as maintain professional standards.

16.2.2.1 Proposed Action

Goal. Provide for the training of natural resources personnel (Department of Army, 1995).

Objective. Implement the above described personnel training program for the NTC & Fort Irwin.

16.2.2.2 Other Management Options

Most of the proposed training is specifically targeted toward natural resources managers on military installations. Professional management of natural resources is required by the Sikes Act. This implies continuing training to maintain professional skills. Thus, while there are many other options to acquire training for natural resources managers at the NTC & Fort Irwin, the option to not train is not viable. Most other training options would not be as specific to the needs of Training Center personnel as outlined in the proposed action.

16.2.3 External Assistance

The rapid development of natural resources management combined with Army personnel cutbacks have resulted in an increased need for outside assistance with natural resources programs on the NTC & Fort Irwin. The installation has used its partnerships in a variety of ways, but particularly for wildlife research, ITAM implementation, cultural resources management and planning, natural resources planning, and others. The growth of environmental compliance requirements has increased many of these needs and added considerably to the need for partners in other areas, including on-the-ground personnel support.

16.2.3.1 Proposed Action

Goal 1. Provide external specialized skills and resources to support the NTC & Fort Irwin natural resources management.

Goal 2. Provide external personnel to assist with the management of the NTC & Fort Irwin natural resources program.

Objective 1. Implement external support projects indicated in the below table, which are described in more detail in appropriate sections of this INRMP.

2001-2005 Natural Resources External Support Project Needs

| Project | Priority* | Agency | Completion | Comments |
|--|------------------|--|-------------------|-----------------|
| ITAM personnel | 1 | contractor | Indefinite | Ongoing |
| Natural and Cultural Resources Section personnel | 1 | contractor/ORISE | Indefinite | Ongoing |
| Dust control | 1 | contractor | Indefinite | Ongoing |
| Plan preparation | 1 | contractors | Project-specific | As needed |
| Cultural resources surveys | 1 | contractor | Project-specific | As needed |
| Burro removal | 1 | BLM, China Lake, National Park Service | Indefinite | Ongoing |
| Goldstone natural resources management | 1 | Goldstone (NASA) | Indefinite | Ongoing |
| Tamarisk removal | 1 | BLM/others | Project-specific | As needed |
| Plant propagation | 1 | National Park Service/ private nurseries | Indefinite | Ongoing |
| Endangered species compliance | 1 | USFWS | Indefinite | As required |
| Desert tortoise management plan | 1 | Department of Army | 1999 | Ongoing |
| Lane Mountain milk vetch survey | 1 | USFWS | 2001 | |
| Raven monitoring/plan | 1 | USGS | Indefinite | |
| Wetland permitting | 1 | Corps of Engineers, Los Angeles District | Project-specific | As required |
| Contracting | 1 | Corps of Engineers, various districts | Project-specific | As needed |
| Enforcement Assistance | 1 | CDFG | Project-specific | As needed |

| Project | Priority* | Agency | Completion | Comments |
|---|-----------|--|------------------|--------------------------------|
| Update/revise INRMP | 1 | DPW, Environmental | 2001 | When required |
| State-listed species management | 2 | CDFG | Indefinite | As needed |
| ITAM bioindicator studies | 2 | various universities/ contractor | Indefinite | Ongoing |
| Environmental Awareness materials | 2 | U.S. Army Environmental Awareness Resource Center | Project-specific | As needed |
| Bat gate construction | 2 | uncertain | 2002 | |
| Alkali mariposa lily and Mohave monkey flower surveys | 2 | uncertain | 2002 | |
| Mohave ground squirrel survey | 2 | California State Univ., Dominguez Hills | 2002 | |
| California black rail survey | 2 | uncertain | 2002 | |
| Bighorn sheep monitoring | 3 | CDFG | Indefinite | Ongoing |
| Cryptogram crust study | 3 | John Carroll University | 1999 | Ongoing - could be extended |
| Soil hydrology study | 3 | University of Nevada, Reno | 1999 | Ongoing |
| Fringe-toed lizard study | 3 | California State Univ., Dominguez Hills | 2000 | |

* 1 Needed as soon as possible for immediate management application.

2 Useful for improving management to a significant degree over a long period.

3 Has good potential to improve long-term management.

16.2.3.1.1 Personnel Assistance

The Intergovernmental Personnel Act of 1972 (IPA) provides a means to conduct research or obtain other personnel assistance at the NTC & Fort Irwin. IPA is a system whereby a federal (or state) agency borrows other federal or state agency personnel for a limited time period to do a specific job. The installation pays the borrowed employee's salary and administrative overhead. There are two advantages: personnel are directly supervised by the NTC & Fort Irwin, and no manpower authorizations are required. The NTC & Fort Irwin is not using IPA agreements in its natural resources program, but it retains the option to use this source of

personnel assistance during 2001-2005. G3 Training uses an IPA agreement for the ITAM field crew and will continue to use this agreement during 2001-2005.

Another "borrowed personnel" option is through the Oak Ridge Institute of Science and Education (ORISE). ORISE involves colleges and universities and a management and operating contractor for the U.S. Department of Energy. The program offers students, post graduates, and associate degree graduates opportunities to gain experience in their respective fields. Stipends are equivalent to salaries for employees hired with similar educational backgrounds, and a 30% overhead is added. The normal limit on individual ORISE personnel is three years. Installations may assist in the selection of ORISE personnel. ORISE personnel are being used at the NTC & Fort Irwin for biological, archeological, and NEPA assistance, and this source of assistance is likely to be continued.

The Student Conservation Association provides another personnel option. This nonprofit national organization has a cooperative agreement with the Department of Army which provides for internships for students and recent graduates to obtain experience in their fields of study. The NTC & Fort Irwin ITAM program used Student Conservation Association personnel in 1997 to assist with trail closure projects. California has a similar organization, the California Conservation Corps.

Volunteers are an occasional source of personnel assistance at the Training Center. Scouts are sometimes used (Section 11.2), and there are occasional other volunteers. One type of project that would be ideal for volunteers is the removal of tamarisk from springs, a labor-intensive task requiring little experience.

Objective 2. Consider using IPA agreements as a source of personnel assistance.

Objective 3. Use ORISE as an important option for personnel assistance.

Objective 4. Maintain the option to use the Student Conservation Association and the California Conservation Corps for assistance with field projects.

Objective 5. Use volunteers as an opportunistic source of assistance.

16.2.3.1.2 University Assistance

Universities are an excellent source of research assistance. As listed in Section 5.5, the NTC & Fort Irwin has used several universities in recent years to help with specialized needs, particularly universities in southern California.

Objective 6. Use universities, particularly California State University Dominguez Hills (ground squirrel survey), University of California Los Angeles (plant surveys), University of California Riverside (invertebrates), San Diego State University (ITAM), John Carroll University, Ohio (cryptogamic crusts and revegetation), and the University of Nevada, Reno (soil hydrology), to assist with implementation of this INRMP.

16.2.3.1.3 Contractor Support

Contractors give the installation access to a wide variety of specialties and fields. Examples of contractor use in recent years are in Section 5.6.

Objective 7. Use contractors to assist with implementation of this INRMP.

16.2.3.1.4 Other Agency Support

As indicated in sections 5.2, 5.3, and 5.4, the NTC & Fort Irwin has relationships with a number of federal and state agencies for support of its natural resources program.

Objective 8. Use State and Federal agencies, particularly this INRMP's signatory partners, the USFWS and CDFG, and BLM, to assist with implementation of this INRMP.

16.2.3.2 Other Management Options

External support projects in the above table are discussed in other sections of this INRMP. Other Management Options are discussed in these sections.

16.3 Data Storage, Retrieval, and Analysis

The capability to store, retrieve, and analyze data is central to professional management of natural resources, and it is essential to implementing the adaptive management aspect of ecosystem management. The NTC & Fort Irwin is committed to providing efficient, cost-effective systems for data storage and analysis.

Data collected will be statistically analyzed and stored in the ITAM office and the Natural and Cultural Resources Section. Data will be available for use by NTC personnel, the MDEP, and other regional initiatives. Data will also be integrated into the GIS system.

Goal. Store, analyze, and use data in an efficient, cost-effective manner.

16.3.1 Microcomputer System

Microcomputers are essential to the routine operation of efficient natural resources management organizations. The volume of data is too substantial to handle without computers, and routine administrative tasks are accomplished considerably more efficiently with computers.

Personal microcomputers are available to all professional personnel within both the Natural and Cultural Resources Section and the ITAM Office. Many personnel, including persons in other Environmental Division sections, have the capability to use ArcView® (ESRI, Redlands, CA), a personal computer-based GIS.

16.3.1.1 Proposed Action

Objective 1. Upgrade hardware and software as needed during the next five years.

16.3.1.2 Other Management Options

The NTC & Fort Irwin could either shut down its microcomputer systems for natural resources management, or it could neglect to upgrade existing hardware and software. Either option would quickly reduce the quality

of both the natural resources and ITAM programs, and the installation would soon be technologically separate from its ecosystem management partners in the Mojave Desert as well as other military installations and commands. The NTC & Fort Irwin has extremely modern microcomputer hardware and software. Additional expenditures could be made, but it is questionable whether they would significantly improve the quality of programs considering the needs of both the natural resources and ITAM programs and the computer expertise of individual personnel.

16.3.2 Geographic Information System

The ITAM program at the NTC & Fort Irwin established a GIS, primarily to support land management programs, during spring 1996. Hardware and software are as follows:

Hardware

UNIX

Sun Ultra 2® (Model 1200) 200 MHZ single processor, 512 Mb RAM, floppy and CDROM drives, with 20" monitor running Solaris 2.6®

25GB (6 – 4.2GB) Multipack disk storage

109GB (6 – 18.1GB) Multipack disk storage

Sun XL® 8mm tape drive

Exabyte AME® Mammoth tape drive

Dual Pentium II 200 MHZ, 128Mb RAM, with 21" monitor running Windows NT 4.0®

CD ROM, CD ROM Writer

Dual Pentium II 333 MHZ, 512 Mb RAM, with 17" monitor running Windows NT 4.0®

CD ROM, Internal Zip® Drive, tape drive

Software

UNIX Solaris®

Arc Info®: Modules included are GRID, TIN, NETWORK, COGO, ARCPress

ArcView 3.1®

Erdas Imagine 8.3 Professional® with Vector and Virtual GIS modules

Windows NT®

Erdas Imagine 8.3.1® Essentials with Virtual GIS

ArcView 3.1® extensions include: Spatial Analyst, 3D Analyst

OnSite Software Beta Testing

Erdas Virtual® GIS for Solaris®

Arcview Image Analyst®

Additional Software for NT

MrSID Compressor®, Canvas®, Corel®, Adobe Acrobat®, Adobe Photoshop®, Image Alchemy®, Microsoft Office® (Word, Excel, Access, Powerpoint)

Network

In addition to the Fort Irwin LAN, the UNIX and NT platforms are connected via a separate LAN, using Solstice Network Client 3.1®

Beginning in 1994, the Mojave Desert Ecosystem Program at the NTC & Fort Irwin has established GIS and Web Services to support land management programs. Hardware and software for this program is as follows:

Hardware]

Sun Server E450 - dual 300 MHZ processors, 256Mb RAM, 17" monitor, Solaris 2.6, Netscape Server and Veritas RAID, and Soltice Backup

90 GB (10-9 GB) Multipack Disk Storage

Sun StoreEdge Multi Tape Backup (8 DLT tapes)

Sun Ultra 2 Creator - single 233 MHZ, 64 Mb RAM, 17" monitor, Solaris 2.6

2 - Sun Ultra 60 - single 360 MHZ, 128 Mb RAM, 24" monitor, Solaris 2.7

NT Server - dual 500 MHZ Pentium III, 256 Mb RAM, NT Server

2 - Workstation - single 500 Pentium III, 256 Mb RAM, 19" monitor, Windows 98

Workstation - single 550 Pentium III, 128 Mb RAM, 19" monitor, Windows 98

Workstation - single 600 Pentium III, 128 Mb RAM, 19" monitor, Windows 98

Workstation - single 600 Pentium III, 128 Mb RAM, 19" monitor, NT Workstation

Workstation - single 233 Pentium II, 96 Mb RAM, 17" monitor, Windows 98

2 - HP 650C plotters - 36" roll length

HP LaserJet 4Si

HP DeskJet 1000C

Cisco 4000 Router

Cisco Pix Firewall

Cisco 24 port Fast Hub

8 port Sun Switch

Software

Solaris 2.6

Solaris 2.7

Veritas 4.0 RAID

Solaris Backup

Netscape Server

NT Server

NT Workstation (2)

Windows 98 (7)

ESRI - Arc Info 7.2 (6)

ESRI - Arc View 3.2 (3)

ESRI - Spatial Analyst

ESRI - Modules are TIN, GRID, NETWORK, COGO, ARCpress

Erdas - Envy 2.5

Additional Software

Office 2000

Norton Anti-virus 2000

Dreamweaver 2.0

Flash 4.0

Photostop 5.5

Webtrends Log Analyzer

Eudora World Mail Server

The NTC & Fort Irwin GIS has developed or obtained extensive databases. Database development will continue during 2001-2005. Most use of GIS has been the production of maps, including maps for military planning and operations. This technology can provide 3D views of training missions, which enables soldiers to visualize terrain. A particularly useful project has been an accident analysis map, which can be used by commanders to identify site-specific safety risks.

The GIS is rapidly becoming the central natural resources data center for both natural resources and ITAM programs on the NTC & Fort Irwin, and it will be increasingly used by other personnel, particularly those in the Environmental Compliance Section. Operations planners use the GIS to portray fire and maneuver options in a much more meaningful manner than can be done using standard maps (Section 9.13.1.2).

16.3.2.1 Proposed Action

Objective 2. Develop a list of database needs for the NTC & Fort Irwin and develop or obtain these databases.

Objective 3. Provide appropriate databases to MDEP, other regional initiatives, and other potential users using a local area network and a wide area network by 2001.

Objective 4. Attach tabular data to spatial data layers, such that a "point and click" provides such data on the spot.

Objective 5. Provide GIS databases via ArcView® to all pertinent Environmental Division personnel.

Objective 6. Make more use of the analytical capabilities of the NTC & Fort Irwin GIS to provide natural resources management options.

Objective 7. Create user-friendly interfaces to enable a wider use of GIS databases specific to the needs of installation users.

Objective 8. Develop a dedicated GIS laboratory with enhanced funding (other than ITAM), equipment, and personnel to service the needs of the total installation.

16.3.2.2 Other Management Options

There are almost limitless options with regard to the rapidly evolving GIS field, ranging from no use of the technology to massive expenditures on numerous software, hardware, and data acquisition options. The NTC & Fort Irwin GIS is very advanced, and database development is impressive considering the short time

the program has been in place. Growth beyond the long range Objective 8 is probably not a viable option as the presence of the MDEP precludes duplication of GIS effort with regard to regional support. The "no use" option of an installation ITAM/Natural Resources GIS is, unfortunately, a reality on some military installations as positions are eliminated as part of downsizing within DoD.

16.3.3 Remotely Sensed Imagery

The oldest aerial photographs of the NTC & Fort Irwin area were likely taken in the 1940s, but these have not been used for natural resources management on the installation. Remote imagery is now utilized for soil and disturbance mapping which provides information concerning land change over time. This type of sampling is being used intensively in the land acquisition process. Low level aerial photography has been used for tracking road proliferation and other types of disturbance.

In 1996 the installation convened a working group to list needs for remote imagery. In April 1997 this effort resulted in color, 0.5-meter resolution digital orthophotographs of the installation and its surrounding lands (a rectangle with a southwestern corner of 35° N, 117° 15' W and a northeastern corner of 35°N, 116°W, with some missing pieces). This project produced 87 gigabytes of data which were compressed to 588 megabytes, placed on a single CD ROM disk, making the data very usable for personnel with personal computers. This is the largest image database that has been compressed to this degree to date.

Lee *et al.* (1997) have been developing improvements to the use of remote sensing to determine disturbance levels on the NTC & Fort Irwin. This project is anticipated to be completed by 2000 (Section 8.1.1).

Current remote imagery is probably adequate for most NTC & Fort Irwin needs during most of the 1999-2003 period. Considering the size of the installation, satellite imagery should be an economical way to monitor changes in the landscape.

16.3.3.1 Proposed Action

Objective 9. Use remote imagery for improved decision-making for military activities, ITAM implementation, environmental management, and natural and cultural resources management and protection.

Objective 10. Obtain additional color, digital orthophotographs at 0.5-meter resolution to "square-off" the existing rectangle, described above.

Objective 11. Obtain color, infrared imagery for vegetative monitoring during the next good rainfall year at 1-meter resolution.

Objective 12. Obtain historic satellite imagery of the installation during past wet years (other El Nino years) for comparisons of the effects of this important phenomenon on installation vegetation.

Objective 13. Complete the remote sensing project (Lee *et al.*, 1997) by 2001.

Objective 14. Determine the potential for use of hyperspectral imagery to enhance vegetation and change detection analyses.

16.3.3.2 Other Management Options

There are many options with regard to the rapidly evolving remote imagery field, ranging from no use of the technology to massive expenditures on data layers. The proposed action continues a very aggressive use of state-of-the-art technology, and it is difficult to justify an enhanced effort beyond what is proposed. No use or significantly less use options for remote imagery are possible, but considering the requirement to maintain the quality of training lands and to comply with environmental laws, these options would ultimately require an even greater expenditure to monitor land conditions using more personnel-intensive methods.

16.4 Project/Program Summary

Goals and objectives within this INRMP, when listed, can be used to monitor the effectiveness of natural resources management at the NTC & Fort Irwin. Appendix 16.4 contains a list of goals and objectives for this INRMP in the order items appear. The list does not include a priority system for two reasons:

- The Sikes Act requires implementation of this INRMP, making it difficult to justify priorities for implementation, which implies priorities for compliance. Federal agencies are required to comply with federal laws.
- Many projects or programs affect obviously high priority species/communities/ecosystems/etc. (federally-listed species, wetlands, etc.) and at the same time affect species/communities/ecosystems/etc. that prior to the passage of the Sikes Act amendments, were not priorities (e.g., nonlisted species, noncritical habitat). It is often difficult to separate the benefactors of many programs. Spring protection and maintenance is a good example.

16.5 Implementation Funding Options

Natural resources management relies on a variety of funding mechanisms, some of which are self-generating and all of which have different application rules. Below are general discussions about different sources of funding to implement this INRMP. As noted, not all of these are now used by the NTC & Fort Irwin.

16.5.1 Environmental Program Requirements

Most projects described in this INRMP, exclusive of ITAM, are budgeted using the Environmental Program Requirements (EPR) Report. Below are sources of funds within the EPR system:

16.5.1.1 Sikes Act Funds

Sikes Act funds are collected via sales of licenses to hunt or fish. They are authorized by the Sikes Act and regulated via AR 200-3, Chapter 6. These funds may be used only for fish and wildlife management on the installation where they are collected. They have no year-end (unobligated funds carry over on 1 October). The NTC & Fort Irwin does not charge a fee for hunting permits; thus, the installation has no Sikes Act funds. This is not expected to change during 2001-2005.

16.5.1.2 Agricultural Funds

Agricultural funds are derived from agricultural leases on installations. They are centrally controlled at

Department of Army and Major Command levels with no requirements for spending where they were generated. AR 200-3 (Chapter 2) outlines procedures for collection and spending these funds. They are primarily intended to offset costs of maintaining agricultural leases, but they are also available for preparing and implementing INRMPs. These are the broadest use funds available exclusively to natural resources managers.

The NTC & Fort Irwin is technically authorized to request agricultural funds from FORSCOM since there is no requirement for funds to be generated at spending installations. However, due to base closures and other factors, agricultural funds are decreasing, so it is unlikely that the Training Center will be able to effectively compete for them during 2001-2005.

16.5.1.3 Environmental Funds

Environmental funds are a special subcategory of Operations and Maintenance funds. They are set aside by the Department of Defense for environmental purposes but are still subject to restrictions of Operations and Maintenance funds. Compliance with laws is the key to getting environmental funding. Environmental funds are most commonly used for projects that return the installation to compliance with federal or state laws, especially if noncompliance is accompanied by Notices of Violation or other enforcement agency actions.

"Must fund" classifications include mitigation identified within *Findings of No Significant Impact* and items required within Federal Facilities Compliance Agreements. This INRMP is a Federal Facilities Requirement Agreement, and some projects and programs within it are used to mitigate various military activities. In addition, 1997 amendments to the Sikes Act require implementation of INRMPs, which make implementation of this INRMP a priority for funding.

The following table lists environmental projects associated with implementation of this INRMP:

Environmental Projects**

| Project | FY 01 | FY 02 | FY 03 | FY 04 | FY 05 | Totals |
|-------------------------------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| GS Biologist Salaries | \$195 | \$205 | \$215 | \$226 | \$237 | \$1,078 |
| Desert Tortoise Surveys | \$200 | \$150 | \$150 | \$150 | \$150 | \$800 |
| Predation Rate Studies | \$80 | \$80 | \$80 | \$80 | \$80 | \$400 |
| Fences and Off-limits Signs | \$20 | \$20 | \$20 | \$20 | \$20 | \$100 |
| Update Pest Management Plan | \$5 | \$5 | \$5 | \$5 | \$5 | \$25 |
| Contractor Salaries | \$1,209 | \$1,269 | \$1,333 | \$1,399 | \$1,470 | \$6,680 |
| Pest Species Abatement | \$150 | \$150 | \$160 | \$160 | \$160 | \$680 |
| Endangered Plants and Animals | \$50 | \$75 | \$100 | \$125 | \$125 | \$475 |
| Endangered Species Expansion Area | \$107 | \$115 | \$100 | \$100 | \$100 | \$522 |
| MDEP Vegetation Mapping | \$68 | | | | | \$68 |
| NEPA Documentation | \$100 | \$100 | \$100 | \$100 | \$100 | \$500 |
| Desert Tortoise URTD Studies | \$45 | \$50 | \$50 | \$50 | \$50 | \$245 |
| MDEP Vertebrate Distribution Maps | \$75 | \$50 | | | | \$125 |
| End. Spp. Fringe-toed Lizard | \$70 | \$75 | | | | \$145 |
| Microinvertebrate Studies | \$60 | \$50 | \$50 | \$50 | \$50 | \$260 |
| Desert Tortoise Life History Study. | \$241 | \$336 | \$336 | \$336 | \$336 | \$1,585 |
| Desert Tortoise Physiology | \$500 | \$408 | \$410 | \$415 | \$426 | \$1,879 |
| Exotic Vegetation Control | \$10 | \$50 | \$50 | \$50 | \$50 | \$210 |
| Totals | \$2,905 | \$3,188 | \$3,159 | \$3,266 | \$3,359 | \$15,777 |

* Funding in thousand of dollars.

Funding for cultural resources projects is included in the Integrated Cultural Resources Management Plan.

The above table indicates environmental funding as of fall 1999. Projects specifically for pest management, cantonment area management, and cultural resources management are not included in this listing.

Thus, the total Environmental Fund budget for this INRMP is estimated at \$15,777,000 for FY 01 - FY 05. These estimates will be adjusted as needed each year.

16.5.2 Training Funds

The NTC & Fort Irwin is a Category I installation with regard to ITAM implementation and funding (Office of the Deputy Chief of Staff for Operations and Plans, 1995). ITAM funding requests are not submitted via the EPR process. Instead, the 5-year ITAM Work Plan is used to channel ITAM funding requests from the NTC & Fort Irwin, through FORSCOM and the Army Training Support Center, to ODCSOPS. The NTC & Fort Irwin requires the following ITAM budget for FY 00 through FY 04:

ITAM Funding*

| Project | FY 00 | FY 01 | FY 02 | FY 03 | FY 04 | Totals |
|---------------|----------------|----------------|----------------|----------------|----------------|----------------|
| LRAM | \$1,197 | \$1,086 | \$1,100 | \$810 | \$899 | \$5,092 |
| EA | \$51 | \$50 | \$75 | \$35 | \$28 | \$239 |
| TRI | \$144 | \$131 | \$160 | \$143 | \$158 | \$736 |
| LCTA/GIS | \$670 | \$788 | \$650 | \$632 | \$465 | \$3,205 |
| Totals | \$2,062 | \$2,055 | \$1,985 | \$1,620 | \$1,550 | \$9,272 |

* Funding in thousand of dollars.

Thus, the total ITAM budget for this INRMP is estimated at \$9,527,000 for 1999-2003. These estimates will be adjusted as needed each year.

16.6 INRMP Implementation Costs

Below is a summary of funding avenues and dollars required for implementation of this INRMP. Due to the timing of this INRMP preparation, the five year budgets for ITAM and Environmental are off by two years.

| Type Funds* | FY 99 | FY 00 | FY 01 | FY 02 | FY 03 | FY 04 | Totals |
|---------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| Environmental | | \$2,905 | \$3,038 | \$3,109 | \$3,216 | \$3,309 | \$15,577 |
| ITAM | \$1,565 | \$2,062 | \$2,055 | \$1,985 | \$1,860 | | \$9,527 |
| Totals | \$1,565 | \$4,967 | \$5,093 | \$5,094 | \$5,076 | \$3,309 | \$25,104 |

* Funds in thousands of dollars.

Thus, total five-year funding to implement this INRMP will be \$25,104,000.

Non-appropriated funds are used to defray outdoor recreation costs, exclusive of hunting programs, associated with this INRMP. However, these costs are not included within this plan.

16.7 Command Support

Command support is essential to implementation of this INRMP. This Plan has the support of the NTC & Fort Irwin Commander and other personnel in command positions who are needed to implement this INRMP. The Command is dedicated to implementation of this INRMP as required by the Sikes Act and other Federal laws. Just as importantly, the Command is dedicated to maintaining and improving the military mission at the NTC & Fort Irwin. Implementation of this INRMP is a means to that end.

17.0 Environmental Consequences

As discussed in Section 1.8.4 of this document, two alternatives are considered feasible:

- a. the Proposed Action with full implementation of the INRMP, and
- b. the Other Management Options alternative, which uses management strategies and objectives not included within the INRMP.

Therefore, the impact on various systems in affected environments will be assessed based on these two alternatives. The Other Management Options alternative is discussed for each proposed action in Chapters 8 through 16 of this INRMP. The Proposed Action is summarized (by goals and objectives) in Appendix 16.4. Below analyses are summaries of these more detailed analyses.

The Proposed Action would not have significant negative environmental consequences compared to existing conditions. The Other Management Options alternative could have a wide range of environmental consequences, ranging from very positive to very negative on various components of the NTC & Fort Irwin environment. The two alternatives differ significantly in their ability to proactively manage natural resources, support the military mission, mitigate environmental damage due to the Army mission, and comply with environmental laws.

The INRMP provides goals and objectives for managing natural resources, a course of action designed to significantly improve the management of NTC & Fort Irwin natural resources. The INRMP allows flexibility in management options as more information becomes available from ongoing and planned studies.

17.1 Geology and Soils

17.1.1 Proposed Action

The Proposed Action includes an integrated program for the planning of land use and maintenance and repair of damaged lands. Brief periods of increased erosion could occur during damaged sites' maintenance and rehabilitation activities, but these would be relatively minor compared to erosion control benefits. The Proposed Action has evolved significantly during the past decade due to experience gained from implementation of the LRAM program, and the Army proposes to take advantage of lessons learned during this process. The Proposed Action offers effective protection and mitigation for damages incurred by soils due to the Army mission.

17.1.2 Other Management Options

Other Management Options range from intensive erosion control programs which would provide relatively good soils protection to virtually no erosion control or damage prevention. The 1997 amendments to the Sikes Act require maintaining the capability of the NTC & Fort Irwin to support its military mission. Actions less than the Proposed Action risk noncompliance with this law. The Proposed Action is based on the Army-wide ITAM program that was developed exclusively to deal with mitigation of military training impacts, and the NTC & Fort Irwin program is funded at the Army's highest level of classification. Thus, it is likely that Other Management Options would have less cost/benefits in terms of soils management than the Proposed

Action.

17.2 Water Resources

The INRMP includes some surface water monitoring, but water quality, except as it directly relates to fisheries management, is not a natural resources program within the Army environmental program. Rather, due to water quality laws, it is considered a compliance program and is the primary responsibility of the Environmental Division, DPW at the NTC & Fort Irwin.

17.2.1 Proposed Action

The Proposed Action has positive effects on surface water quality, but surface water quality, related to erosion, is not significantly threatened at the NTC & Fort Irwin due to the highly protected nature of the few surface waters on the installation. Thus, the Proposed Action has no significant negative impacts to surface water resources on the Training Center. Implementation of the Proposed Action would not affect groundwater.

17.2.2 Other Management Options

Provided that Other Management Options do not include removal of protection of surface water sites, this alternative would likely have no significant impacts to surface water resources on the Training Center. Other Management Options could not include objectives that would lead to water quality degradation in terms of noncompliance with water quality standards. By definition of natural resources programs with the Army environmental program, implementation of Other Management Options would not affect groundwater.

17.3 Biological Resources

17.3.1 Proposed Action

The Proposed Action would provide management of faunal and floral resources at the NTC & Fort Irwin on an integrated basis. The INRMP uses an ecosystem management strategy to achieve biological diversity conservation, in accordance with the Department of Defense Biodiversity Initiative (The Keystone Center, 1996). It emphasizes the use of native species, as emphasized on the Presidential memorandum to the heads of federal agencies (Office of the President, 1994).

The Proposed Action includes specific actions to manage the Mojave Desert ecosystem, including wildlife habitat protection and enhancement, wildlife population management, cantonment area management, protection of special interest natural areas, and an integrated approach to pest management. These programs include protection from wildfires, monitoring a variety of plants and animals, wetlands protection, spring enhancement and protection, and minimization and repair of damage to habitat by human activities. Implementation of NEPA under this INRMP would provide a methodology to help ensure compliance with laws and regulations affecting biological resources at the NTC & Fort Irwin.

The Proposed Action also provides a means to use biological resources for a variety of human uses, a major tenant of ecosystem management. These uses include military activities and a variety of outdoor recreational uses, including hunting, nature study, and others.

17.3.2 Other Management Options

Management options selected within the INRMP are the result of decades of on-the-ground management of biological resources on the NTC & Fort Irwin as well as countless consultations with local and regional resources management professionals. The INRMP package represents the best opinions of the NTC & Fort Irwin natural resources personnel as well as those of cooperating partner agencies.

Therefore, the Other Management Options, as a total package, would likely produce a lesser degree of ecosystem-wide benefits or be detrimental to some biological resources. Below are a few examples of other options and their likely effects:

- Surveys could ignore species such as the Mohave ground squirrel, alkali mariposa lily, California black rail, and Mohave monkey flower. This would make it virtually impossible to provide any protection for these State-listed species.
- Active management of springs, particularly protection from military damage and exotic plant species removal, could be removed or reduced in scope. Considering the vital nature of these springs to many plant and wildlife species on the NTC & Fort Irwin, this could drastically reduce biological diversity and abundance at the Training Center.
- The NTC & Fort Irwin could minimize interagency coordination. This would adversely affect natural resources management effectiveness at the Training Center and adversely affect management of the Mojave Desert ecosystem as a whole.
- The NTC & Fort Irwin could choose to not participate in burro removal programs. This would significantly negatively affect native plants and animals on the Training Center and decrease the success of burro management programs on neighboring lands.
- The NTC & Fort Irwin could reduce its efforts to educate military and civilian users of the installation of the effects of their actions on the ecosystem. This, in turn, would likely result in increased impacts to the Mojave Desert ecosystem at the Training Center.
- NTC & Fort Irwin landscapes could be more intensively managed for human-related aesthetic qualities. This would reduce the amount of wildlife habitat for most native species, increase risks involved with more pesticide/herbicide use, reduce groundwater reserves, and encourage the spread of exotic ornamental plants.

The Other Management Options alternative would likely produce a less-balanced effect on biological resources than the Proposed Action. However, the degree of effect would be dependent upon objectives of natural resources management and the degree of implementation applied.

Other Management Options would likely emphasize reaction to problems rather than a proactive approach to natural resources management. This approach would emphasize responses to current needs to support the military mission as well as site-specific responses to environmental compliance. Surveys and monitoring of natural resources, and long term programs, would be lower priority. A reaction-to-problems approach would probably achieve compliance with laws, but it would not provide as many benefits to biological resources and would be more expensive in the long-term. Such implementation would decrease outdoor recreational opportunities associated with biological resources on the NTC & Fort Irwin.

17.4 Air Quality

This INRMP affects air quality with regard to the generation of finely divided particulate matter (PM 10) as a result of military activities on the NTC & Fort Irwin.

17.4.1 Proposed Action

The Proposed Action includes implementation of the LRAM program, within which reduced dust generation is a major project. The Proposed Action will reduce the generation of PM 10 through the maintenance of most playas as off-limits, the application of dust retardants to main tank trails, and the revegetation of damaged lands and closures of trails.

17.4.2 Other Management Options

Other Management Options could include greater expenditures for direct dust control, the closure of the two remaining open playas, and/or more revegetation. However, due to the highest classification of the NTC & Fort Irwin for ITAM implementation, it is unlikely that these expenditures are viable. However, if they were to occur, greater reductions in PM 10 would likely occur.

Conversely, these programs could be reduced in scope or intensity. This action, in turn, would increase the generation of PM 10.

17.5 Cultural Resources

17.5.1 Proposed Action

The proposed implementation of the INRMP would be beneficial to the protection of cultural resources. The Proposed Action includes steps to protect cultural resources sites from damage during implementation of this plan. Ground-disturbing natural resources projects in unsurveyed areas must have site-specific surveys prior to implementation. The review of projects by the Cultural Resources Manager and the NEPA process are used to ensure protection of known and potential cultural resources while implementing the INRMP. Implementation of the ITAM program, particularly marking off-limits sites and reducing erosion hazards, is a significant benefit of the Proposed Action to archeological resources.

17.5.2 Other Management Options

The Other Management Options alternative would have no direct negative effects on cultural resources since the NTC & Fort Irwin would still have to comply with laws and policies related to cultural resources. However, if Other Management Options selected included a reduced level of LRAM, the degree of protection to archeological sites would be decreased. Many Other Management Options are potential undertakings and could require site-specific cultural resources surveys in unsurveyed areas. The amount of survey would be determined by the number of ground-disturbing projects proposed for unsurveyed areas.

17.6 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, directs federal agencies to identify and address disproportionately high and adverse human or environmental impacts of their program, policies, and activities on minority or low income populations in the surrounding community. The remote location of the NTC & Fort Irwin in relation to populated areas minimizes the potential for disproportionate impacts on minority or disadvantaged groups of people.

17.6.1 Proposed Action

There is no evidence or suggestion that the Proposed Action will disproportionately affect any minority or disadvantaged group of people in the area.

17.6.2 Other Management Options

There is no evidence or suggestion that Other Management Options discussed in this INRMP will disproportionately affect any minority or disadvantaged group of people in the area.

17.7 Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997) recognizes a growing body of scientific knowledge demonstrating that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because children's bodily systems are not fully developed, because they eat, drink, and breathe more in proportion to their body weight, because their size and weight may diminish protection from standard safety features, and because their behavior patterns may make them more susceptible to accidents.

The President directed each federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

17.7.1 Proposed Action

The Proposed Action would not have a disproportionate environmental health risk or safety risk to children.

17.7.2 Other Management Options

Other Management Options would not have a disproportionate environmental health risk or safety risk to children.

17.8 Findings and Conclusions

The National Training Center and Fort Irwin should implement an Integrated Natural Resource Management Plan at Fort Irwin, California for the period 1999-2003 to manage natural resources, support the military

mission, mitigate environmental effects of the overall military mission, and comply with various environmental laws. Full implementation of the INRMP will also ensure the continued use of NTC & Fort Irwin natural resources for the military mission and outdoor recreational uses.

Implementing the NTC & Fort Irwin INRMP would result in no significant detrimental impacts to environmental systems. Minor adverse impacts on wildlife habitat will be mitigated by full implementation of restorative and proactive wildlife management provisions in the INRMP. There would be beneficial consequences to the INRMP, such as reducing negative impacts to soil, water, air, and biological resources, thereby avoiding violations of federal and state laws, including the Sikes Act, Endangered Species Act, Clean Air Act, and NEPA. Full implementation (the Proposed Action) would allow the Army to manage its natural resources at the NTC & Fort Irwin in a proactive manner to meet current and future conservation needs.

Implementing the INRMP would not constitute a major Federal action significantly affecting the quality of the environment. A Finding of No Significant Impact, Appendix 17.8, should be published.

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PERSONS CONTACTED

Roger Adams - GIS Coordinator, Anteon Corporation (ITAM Office, G3)
Russell Blaine - LRAM Coordinator, Anteon Corporation (ITAM Office, G3)
Clarence Everly - MDEP DoD Coordinator, UNITEC (Directorate of Public Works)
Peter Hickman - LCTA Coordinator, Anteon Corporation (ITAM Office, G3)
Wayne Johnson - ITAM Program Manager, Anteon Corporation (ITAM Office, G3)
Carolyn Lackey - NEPA Coordinator, Directorate of Public Works
Christine A. McAllister - GIS Coordinator, MDEP, ATA Corporation (Directorate of Public Works)
W. Mickey Quillman - Natural and Cultural Resources Manager, Directorate of Public Works
Rene J. Quinones - Planner/Energy Manager, Directorate of Public Works
Jack Ross - Community Recreation Officer, Directorate of Community Activities
Ruth Sparks - ITAM Project Coordinator, Anteon Corporation (ITAM Office, G3)

PLAN PREPARERS

Blythe, Jeff - Natural and Cultural Resources Planner, Gene Stout and Associates, Loveland, CO
Stout, Gene - Project Manager, Gene Stout and Associates, Loveland, CO
Trousil, Jeff - Natural Resources Planner, Gene Stout and Associates, Loveland, CO

ACRONYMS AND ABBREVIATIONS

| | |
|---------|--|
| AFB | Air Force Base |
| ac | acres |
| AR | Army Regulation |
| ARPA | Archeological Resources Protection Act |
| BLM | Bureau of Land Management |
| BLUEFOR | Blue Force (Rotation Training Unit) |
| C | Celsius |
| CD | compact disk |
| CDFG | California Department of Fish and Game |
| CEQA | California Environmental Quality Act |
| CFR | Code of Federal Regulations |
| cm | centimeters |
| CNDDDB | California Natural Diversity Database |
| CNPS | California Native Plant Society |
| CRM | Cultural Resources Manager |
| DCA | Directorate of Community Activities |
| DoD | Department of Defense |
| DPW | Directorate of Public Works |
| EPR | Environmental Program Requirements |
| ESMP | Endangered Species Management Plan |
| F | Fahrenheit |
| FONSI | Finding Of No Significant Impact |
| FORSCOM | Forces Command |
| GIS | geographic information system |
| ha | hectares |
| INRMP | Integrated Natural Resources Management Plan |
| IPA | Intergovernmental Personnel Act |
| IPM | Integrated Pest Management |
| ITAM | Integrated Training Area Management |
| km | kilometers |
| LCTA | Land Condition Trend Analysis |
| LRAM | Land Rehabilitation and Maintenance |
| LURS | Land Use Requirement Study |
| m | meters |
| MAAR | Mojave Anti-Aircraft Range |
| MDEP | Mojave Desert Ecosystem Program |
| mgd | million gallons per day |
| MILES | Multiple Integrated Laser Engagement System |
| MOU | Memorandum of Understanding |
| mph | miles per hour |
| msl | mean sea level |
| MSR | main supply route |
| NAGPRA | Native American Graves Protection and Repatriation Act |
| NASA | National Aeronautics and Space Administration |

| | |
|----------|---|
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NRCS | Natural Resource Conservation Service |
| NRHP | National Register of Historic Places |
| NTC | National Training Center |
| ODCSOPS | Office of the Deputy Chief of Staff for Operations and Plans |
| OC | Observer Controller |
| OHV | off-highway vehicle |
| OPFOR | Opposing Force |
| ORISE | Oak Ridge Institute of Science and Education |
| PACIDERM | Planning And Coordination of Interagency Desert Environmental Resources Managers |
| PM | particulate matter |
| ppm | parts per million |
| SCS | Soil Conservation Service |
| SHPO | State Historic Preservation Office |
| SRP | Site Rehabilitation Prioritization |
| TDS | total dissolved solids |
| TRI | Training Requirements Integration |
| U.S. | United States |
| USC | United States Code |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| UTM | Universal Transverse Mercator |
| WMCMP | Western Mojave Coordinated Management Plan |
| WSA | Wilderness Study Area |

INTEGRATED NATURAL RESOURCES

MANAGEMENT PLAN AND
ENVIRONMENTAL ASSESSMENT

NATIONAL TRAINING CENTER AND FORT IRWIN,
CALIFORNIA

APPENDICES

APPENDIX 5.3.1.1: Items of Cooperation Between the U.S. Fish and Wildlife Service, California Department of Fish and Game, and the National Training Center and Fort Irwin

PURPOSE: The purpose of this document is to specifically list items to be provided by the California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service (USFWS), and the National Training Center and Fort Irwin (NTC & Fort Irwin) for cooperative implementation of the NTC & Fort Irwin Integrated Natural Resources Management Plan (INRMP). Items not specifically listed will generally be the responsibility of the NTC & Fort Irwin unless the other agencies agree to assist with their implementation.

AUTHORITY: In accordance with the authority contained in Title 10, U.S. Code, Section 2671, and Title 16, U.S. Code, Section 670 the Department of Defense, the Department of Interior, and the State of California, through their duly designated representatives whose signatures appear on the NTC & Fort Irwin INRMP, specifically approve the INRMP and the below specific items of cooperation among the three agencies.

MUTUAL AGREEMENT:

- Persons hunting the lands of the NTC & Fort Irwin shall be required to obtain special NTC & Fort Irwin hunting licenses unless exempt by NTC & Fort Irwin regulations. There will be no charge for these permits unless coordinated with the signatory partners of this INRMP. Persons guilty of violating the requirement for these special licenses may be prosecuted under 10 USC 2671(c).
- Persons hunting the lands of the NTC & Fort Irwin must purchase State licenses, tags, and stamps as required by the CDFG, unless exempt by CDFG regulations.
- A Federal waterfowl stamp is required for hunting waterfowl as prescribed by Federal laws.
- All hunting on the NTC & Fort Irwin will be in accordance with federal and state game laws.
- Representatives of the CDFG and the USFWS will be admitted to the installation at reasonable times, subject to requirements of military necessity and security.
- The CDFG and USFWS shall furnish technical assistance for development and implementation of professionally sound natural resources programs on the NTC & Fort Irwin provided funding for such support is available.
- The NTC & Fort Irwin shall furnish assistance and facilities to the CDFG and/or USFWS for mutually agreed upon natural resources research projects.
- No exotic species of fish or wildlife will be introduced on NTC & Fort Irwin lands without prior written approval of the Army, CDFG, and the USFWS.
- The CDFG shall establish season and bag limits for harvest of game species on the NTC & Fort Irwin.
- Hunting on the NTC & Fort Irwin will be authorized and controlled by the installation commander in accordance with locally published installation regulations promulgated in compliance with applicable Federal and State laws, Army regulations, military requirements, and the INRMP.
- Hunting will be allowed only in areas where there is no conflict with military training activities and no unreasonable safety hazard to participants, military personnel and dependents, or Army civilian employees. Certain areas will be closed to hunting, including, but not limited to, impact areas

- containing unexploded ordnance.
- Enforcement of wildlife laws will be a joint responsibility of the NTC & Fort Irwin, the CDFG, and the USFWS.
- The NTC & Fort Irwin agrees to cooperate with USFWS and CDFG for management of threatened or endangered species residing on the installation. Such efforts will be in compliance with Federal and State laws and applicable Army regulations.
- The NTC & Fort Irwin has the option to directly transfer funds to the CDFG and USFWS for implementation of this INRMP.
- It is understood that implementation of this INRMP requires certain latitude with regard to professional decisions. However, the NTC & Fort Irwin agrees that any land use change which significantly impacts natural resources must include modification of this INRMP in addition to any other environmental compliance requirements.

LIMITATIONS:

The military mission of the NTC & Fort Irwin supersedes natural resources management and associated recreational activities, and such activities must be compatible with the military mission. However, where there is conflict between the military mission and provisions of the Endangered Species Act, the Sikes Act, or any other law associated with natural resources conservation, such conflicts will be resolved according to statutory requirements.

REQUIRED REFERENCES:

- Nothing contained in this agreement shall modify any rights granted by treaty to any Native American tribe or to members thereof.
- The possession of a special permit for hunting migratory game birds will not relieve the permittees of the requirements of the Migratory Bird Stamp Act, as amended.
- This INRMP is a Federal Facilities Compliance Agreement.
- As required by the Sikes Act, the following agreements are made:

(1) This NTC & Fort Irwin INRMP is the planning document required by the Sikes Act, as amended. This Plan contains those items specifically required by law. In the event the Sikes Act is amended after this INRMP is signed, this plan will be amended to conform with the new requirements within the Sikes Act, if needed.

(2) This plan will be reviewed by the CDFG, USFWS, and the NTC & Fort Irwin on a regular basis, but not less often than every five years.

(3) No land or forest products from the NTC & Fort Irwin will be sold under Section 2665 (a) or (b), Title 10 USC and no land will be leased on the NTC & Fort Irwin under Section 2667 of such Title 10 unless the effects of such sales or leases are compatible with the purposes of the INRMP.

(4) With regard to implementation and enforcement of the NTC & Fort Irwin INRMP, neither Office of Management and Budget Circular A-76 nor any successor circular thereto applies to the procurement of services that are necessary for that implementation and enforcement, and priority shall be given to the entering into of contracts for the procurement of such implementation and enforcement services with Federal and State agencies having responsibility for the conservation or management of fish or wildlife.

(5) The NTC & Fort Irwin INRMP is not, nor will be treated as, a cooperative agreement to which chapter 63 of title 31, United States Code applies.

(6) This INRMP will become effective upon the date subscribed by the last signature and shall continue in full force for a period of five years or until terminated by written notice to the other parties by any of the parties signing this agreement. This agreement may be amended or revised by agreement between the parties hereto. Action to amend or revise may originate with any of the other participating agencies.

APPENDIX 6.7: Fauna on the NTC & Fort Irwin

| Common Name | Scientific Name |
|------------------------------|--|
| <i>Fish</i> | |
| mosquitofish | <i>Gambusia affinis</i> |
| <i>Reptiles</i> | |
| desert tortoise | <i>Xerobates (=Gopherus) agassizii</i> |
| banded gecko | <i>Coleonyx variegatus</i> |
| desert iguana | <i>Dipsosaurus dorsalis</i> |
| chuckwalla | <i>Sauromalus obesus</i> |
| zebra-tailed lizard | <i>Callisaurus draconoides</i> |
| Mojave fringe-toed lizard | <i>Uma scoparia</i> |
| collared lizard | <i>Crotaphytus collaris</i> |
| long-nosed leopard lizard | <i>Gambelia wislizenii</i> |
| desert spiny lizard | <i>Sceloporus magister</i> |
| western fence lizard | <i>Sceloporus occidentalis</i> |
| side-blotched lizard | <i>Uta stansburiana</i> |
| long-tailed brush lizard | <i>Urosaurus graciosus</i> |
| desert horned lizard | <i>Phrynosoma platyrhinos</i> |
| common night lizard | <i>Xantusia vigilis</i> |
| Mojave black-collared lizard | <i>Crotaphytus bicintores</i> |
| western whiptail | <i>Cnemidophorus tigris</i> |
| western blind snake | <i>Leptotyphlops humilis</i> |
| rosy boa | <i>Lichanura trivirgata</i> |
| spotted leaf-nosed snake | <i>Phyllorhynchus decurtatus</i> |
| coachwhip | <i>Masticophis flagellum</i> |

| Common Name | Scientific Name |
|----------------------------|--------------------------------|
| western patch-nosed snake | <i>Salvadora hexalepis</i> |
| glossy snake | <i>Arizona elegans</i> |
| ground snake | <i>Sonora semiannulata</i> |
| gopher snake | <i>Pituophis melanoleucus</i> |
| common kingsnake | <i>Lampropeltis getulus</i> |
| long-nosed snake | <i>Rhinocheilus lecontei</i> |
| western shovel-nosed snake | <i>Chionactis occipitalis</i> |
| desert night snake | <i>Hypsiglena torquata</i> |
| speckled rattlesnake | <i>Crotalus mitchelli</i> |
| sidewinder | <i>Crotalus cerastes</i> |
| lyre snake | <i>Trimorphodon biscutatus</i> |
| Mojave rattlesnake | <i>Crotalus scutulatus</i> |

Birds

| | |
|---------------------------|----------------------------------|
| pied-billed grebe | <i>Podilymbus podiceps</i> |
| horned grebe | <i>Podiceps auritus</i> |
| eared grebe | <i>Podiceps nigricollis</i> |
| American white pelican | <i>Pelecanus erythrorhynchos</i> |
| great blue heron | <i>Ardea herodias</i> |
| great egret | <i>Casmerodius albus</i> |
| snowy egret | <i>Egretta thula</i> |
| cattle egret | <i>Bubulcus ibis</i> |
| green-backed heron | <i>Butorides striatus</i> |
| black-crowned night heron | <i>Nycticorax nycticorax</i> |
| white-faced ibis | <i>Plegadis chihi</i> |
| Canada goose | <i>Branta canadensis</i> |

| Common Name | Scientific Name |
|------------------------|---------------------------|
| wood duck | <i>Aix sponsa</i> |
| green-winged teal | <i>Anas crecca</i> |
| mallard | <i>Anas platyrhynchos</i> |
| northern pintail | <i>Anas acuta</i> |
| blue-winged teal | <i>Anas discors</i> |
| cinnamon teal | <i>Anas cyanoptera</i> |
| northern shoveler | <i>Anas clypeata</i> |
| gadwall | <i>Anas strepera</i> |
| American widgeon | <i>Anas americana</i> |
| canvasback | <i>Aythya valisineria</i> |
| redhead | <i>Aythya americana</i> |
| ring-necked duck | <i>Aythya collaris</i> |
| lesser scaup | <i>Aythya affinis</i> |
| bufflehead | <i>Bucephala albeola</i> |
| red-breasted merganser | <i>Mergus serrator</i> |
| ruddy duck | <i>Oxyura jamaicensis</i> |
| turkey vulture | <i>Cathartes aura</i> |
| osprey | <i>Pandion haliaetus</i> |
| northern harrier | <i>Circus cyaneus</i> |
| sharp-shinned hawk | <i>Accipiter striatus</i> |
| Cooper's hawk | <i>Accipiter cooperii</i> |
| red-tailed hawk | <i>Buteo jamaicensis</i> |
| Swainson's hawk | <i>Buteo swainsoni</i> |
| ferruginous hawk | <i>Buteo regalis</i> |
| golden eagle | <i>Aquila chrysaetos</i> |
| American kestrel | <i>Falco sparverius</i> |

| Common Name | Scientific Name |
|-----------------------|--|
| peregrine falcon | <i>Falco peregrinus anatum</i> |
| prairie falcon | <i>Falco mexicanus</i> |
| chukar | <i>Alectoris chukar</i> |
| Gambel's quail | <i>Callipepla gambelii</i> |
| California quail | <i>Callipepla californica</i> |
| California black rail | <i>Laterallus jamaicensis coturniculus</i> |
| Virginia rail | <i>Rallus limicola</i> |
| sora | <i>Porzana carolina</i> |
| American coot | <i>Fulica americana</i> |
| killdeer | <i>Charadrius vociferus</i> |
| semipalmated plover | <i>Charadrius semipalmatus</i> |
| black-necked stilt | <i>Himantopus mexicanus</i> |
| American avocet | <i>Recurvirostra americana</i> |
| greater yellowlegs | <i>Tringa melanoleuca</i> |
| lesser yellowlegs | <i>Tringa flavipes</i> |
| solitary sandpiper | <i>Tringa solitaria</i> |
| spotted sandpiper | <i>Actitis macularia</i> |
| western sandpiper | <i>Calidris mauri</i> |
| least sandpiper | <i>Calidris minutilla</i> |
| dunlin | <i>Calidris alpina</i> |
| long-billed dowitcher | <i>Limnodromus scolopaceus</i> |
| common snipe | <i>Gallinago gallinago</i> |
| Wilson's phalarope | <i>Phalaropus tricolor</i> |
| red-necked phalarope | <i>Phalaropus lobatus</i> |
| Franklin's gull | <i>Larus pipixcan</i> |

| Common Name | Scientific Name |
|---------------------------|--------------------------------|
| Bonaparte's gull | <i>Larus philadelphia</i> |
| ring-billed gull | <i>Larus delawarensis</i> |
| California gull | <i>Larus californicus</i> |
| yellow-footed gull | <i>Larus livens</i> |
| Foster's tern | <i>Sterna fosteri</i> |
| black tern | <i>Chlidonias niger</i> |
| rock dove | <i>Columba livia</i> |
| ringed turtle-dove | <i>Streptopelia risoria</i> |
| white-winged dove | <i>Zenaida asiatica</i> |
| mourning dove | <i>Zenaida macroura</i> |
| greater roadrunner | <i>Geococcyx californianus</i> |
| common barn-owl | <i>Tyto alba</i> |
| short-eared owl | <i>Asio flammeus</i> |
| long-eared owl | <i>Asio otus</i> |
| great horned owl | <i>Bubo virginianus</i> |
| burrowing owl | <i>Athene cunicularia</i> |
| lesser nighthawk | <i>Chordeiles acutipennis</i> |
| common poorwill | <i>Phalaenoptilus nuttalli</i> |
| white-throated swift | <i>Aeronautes saxatalis</i> |
| Vaux's swift | <i>Chaetura vauxi</i> |
| Costa's hummingbird | <i>Calypte costae</i> |
| black-chinned hummingbird | <i>Archilochus alexandri</i> |
| rufous hummingbird | <i>Selasphorus rufus</i> |
| belted kingfisher | <i>Ceryle alcyon</i> |
| acorn woodpecker | <i>Melanerpes formicivorus</i> |
| ladder-backed woodpecker | <i>Picoides scalaris</i> |

| Common Name | Scientific Name |
|--------------------------------|--|
| Gila woodpecker | <i>Melanerpes uropygialis</i> |
| northern flicker | <i>Colaptes auratus</i> |
| western kingbird | <i>Tyrannus verticalis</i> |
| ash-throated flycatcher | <i>Myiarchus cinerascens</i> |
| southwestern willow flycatcher | <i>Empidonax traillii extimus</i> |
| willow flycatcher | <i>Empidonax traillii</i> |
| vermillion flycatcher | <i>Pyrocephalus rubinus</i> |
| western wood-pewee | <i>Contopus cordidulus</i> |
| Say's phoebe | <i>Sayornis saya</i> |
| black phoebe | <i>Sayornis nigricans</i> |
| olive-sided flycatcher | <i>Contopus borealis</i> |
| Cassin's kingbird | <i>Tyrannus vocierans</i> |
| horned lark | <i>Eremophila alpestris</i> |
| barn swallow | <i>Hirundo rustica</i> |
| cliff swallow | <i>Hirundo pyrrhonata</i> |
| violet-green swallow | <i>Tachycineta thalassina</i> |
| northern rough-winged swallow | <i>Stelgidopteryx serripennis</i> |
| tree swallow | <i>Tachycineta bicolor</i> |
| common raven | <i>Corvus corax</i> |
| verdin | <i>Auriparus flaviceps</i> |
| red-breasted nuthatch | <i>Sitta canadensis</i> |
| Bewick's wren | <i>Thryomanes bewickii</i> |
| rock wren | <i>Salpinctes obsoletus</i> |
| cactus wren | <i>Campylorhynchus brunneicapillus</i> |
| canyon wren | <i>Catherpes mexicanus</i> |

| Common Name | Scientific Name |
|--------------------------|------------------------------|
| house wren | <i>Troglodytes aedon</i> |
| marsh wren | <i>Cistothorus palustris</i> |
| ruby-crowned kinglet | <i>Regulus calendula</i> |
| blue-gray gnatcatcher | <i>Poliophtila caerulea</i> |
| black-tailed gnatcatcher | <i>Poliophtila melanura</i> |
| mountain bluebird | <i>Sialic currucoides</i> |
| Townsend's solitaire | <i>Myadestes townsendi</i> |
| hermit thrush | <i>Catharus guttatus</i> |
| Swainson's thrush | <i>Catharus ustulatus</i> |
| American robin | <i>Tudus migratorius</i> |
| northern mockingbird | <i>Mimus polyglottos</i> |
| LeConte's thrasher | <i>Toxostoma lecontei</i> |
| Bendire's thrasher | <i>Toxostoma bendirei</i> |
| crissal thrasher | <i>Toxostoma dorsale</i> |
| sage thrasher | <i>Oreoscoptes montanus</i> |
| water pipit | <i>Anthus spinoletta</i> |
| cedar waxwing | <i>Bombycilla cedrorum</i> |
| phaniopepla | <i>Phaniopepla nitens</i> |
| loggerhead shrike | <i>Lanius ludovicianus</i> |
| European starling | <i>Sturnus vulgaris</i> |
| solitary vireo | <i>Vireo solitarius</i> |
| Hutton's vireo | <i>Vireo huttoni</i> |
| warbling vireo | <i>Vireo gilvus</i> |
| least Bell's vireo | <i>Vireo bellii pusillus</i> |
| gray vireo | <i>Vireo vicinior</i> |
| Virginia's warbler | <i>Vermivora virginiae</i> |

| Common Name | Scientific Name |
|-----------------------------|----------------------------------|
| Townsend's warbler | <i>Dendroica townsendi</i> |
| MacGillivray's warbler | <i>Oporornis tolmiei</i> |
| yellow-rumped warbler | <i>Dendroica coronata</i> |
| yellow warbler | <i>Dendroica petechia</i> |
| orange-crowned warbler | <i>Vermivora celata</i> |
| yellow-breasted chat | <i>Icteria virens</i> |
| common yellowthroat | <i>Geothlypis trichas</i> |
| Wilson's warbler | <i>Wilsonia pusilla</i> |
| hermit warbler | <i>Dendroica occidentalis</i> |
| Nashville warbler | <i>Vermivora ruficapilla</i> |
| black-throated gray warbler | <i>Dendroica nigrescens</i> |
| western tanager | <i>Piranga ludoviciana</i> |
| black-headed grosbeak | <i>Pheucticus melanocephalus</i> |
| Lazuli bunting | <i>Passerina amoena</i> |
| indigo bunting | <i>Passerina cyanea</i> |
| green-tailed towhee | <i>Pipilo chlorurus</i> |
| rufous-sided towhee | <i>Pipilo erythrophthalmus</i> |
| lark sparrow | <i>Calamospiza melanocorys</i> |
| white-crowned sparrow | <i>Zonotrichia leucophrys</i> |
| sage sparrow | <i>Amphispiza belli</i> |
| black-throated sparrow | <i>Amphispiza bilineata</i> |
| song sparrow | <i>Melospiza melodia</i> |
| fox sparrow | <i>Passerella iliaca</i> |
| chipping sparrow | <i>Spizella passerina</i> |
| rufous-crowned sparrow | <i>Aimophila ruficeps</i> |

| Common Name | Scientific Name |
|-------------------------|--------------------------------------|
| Brewer's sparrow | <i>Spizella breweri</i> |
| savannah sparrow | <i>Passerculus sandwichensis</i> |
| clay-colored sparrow | <i>Spizella pallida</i> |
| grasshopper sparrow | <i>Ammodramus savannarum</i> |
| golden-crowned sparrow | <i>Zonotrichia atricapilla</i> |
| dark-eyed junco | <i>Junco hyemalis</i> |
| bobolink | <i>Dolichonyx oryzivorus</i> |
| red-winged blackbird | <i>Agelaius phoeniceus</i> |
| western meadowlark | <i>Sturnella neglecta</i> |
| yellow-headed blackbird | <i>Xanthocephalus xanthocephalus</i> |
| rusty blackbird | <i>Euphagus carolinus</i> |
| Brewer's blackbird | <i>Euphagus cyanocephalus</i> |
| brown-headed cowbird | <i>Molothrus ater</i> |
| great-tailed grackle | <i>Quiscalus mexicanus</i> |
| Bullock's oriole | <i>Icterus galbula bullocki</i> |
| Scott's oriole | <i>Icterus parisorum</i> |
| hooded oriole | <i>Icterus cucullatus</i> |
| northern oriole | <i>Icterus galbula</i> |
| house finch | <i>Carpodacus mexicanus</i> |
| Lawrence's goldfinch | <i>Carduelis lawrencei</i> |
| lesser goldfinch | <i>Carduelis psaltria</i> |
| house sparrow | <i>Passer domesticus</i> |
| Mammals | |
| pallid bat | <i>Antrozous pallidus</i> |
| western pipistrel | <i>Pipistrellus hesperus</i> |
| California myotis | <i>Myotis californicus</i> |

| Common Name | Scientific Name |
|-----------------------------|----------------------------------|
| badger | <i>Taxidea taxus</i> |
| spotted skunk | <i>Spilogale putorius</i> |
| coyote | <i>Canis latrans</i> |
| kit fox | <i>Vulpes macrotis</i> |
| grey fox | <i>Urocyon cinereoargenteus</i> |
| bobcat | <i>Lynx rufus</i> |
| mountain lion | <i>Felis concolor</i> |
| whitetail antelope squirrel | <i>Ammospermophilus leucurus</i> |
| Mohave ground squirrel | <i>Spermophilus mohavensis</i> |
| Botta's pocket gopher | <i>Thomomys bottae</i> |
| long-tailed pocket mouse | <i>Chaetodipus formosus</i> |
| little pocket mouse | <i>Perognathus longimembris</i> |
| Great Basin pocket mouse | <i>Perognathus parvus</i> |
| desert pocket mouse | <i>Perognathus penicillatus</i> |
| cactus mouse | <i>Perognathus eremicus</i> |
| desert kangaroo rat | <i>Dipodomys deserti</i> |
| Merriam's kangaroo rat | <i>Dipodomys merriami</i> |
| Great Basin kangaroo rat | <i>Dipodomys microps</i> |
| Panamint kangaroo rat | <i>Dipodomys panamintinus</i> |
| western harvest mouse | <i>Reithrodontomys megalotis</i> |
| canyon mouse | <i>Peromyscus crinitus</i> |
| deer mouse | <i>Peromyscus maniculatus</i> |
| southern grasshopper mouse | <i>Onychomys torridus</i> |
| desert woodrat | <i>Neotoma lepida</i> |
| blacktail jackrabbit | <i>Lepus californicus</i> |

| Common Name | Scientific Name |
|-------------------------------|--------------------------------|
| desert cottontail | <i>Sylvilagus audubonii</i> |
| feral burro | <i>Equus asinus</i> |
| Nelson's desert bighorn sheep | <i>Ovis canadensis nelsoni</i> |

APPENDIX 16.4: List of INRMP Goals and Objectives

Chapter 8. Inventory and Monitoring

General Goal 1. Inventory NTC and Fort Irwin natural resources and regularly monitor resources that are indicators of overall ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

General Goal 2. Analyze inventory and monitoring data to implement an adaptive management strategy, using landscape level monitoring protocols.

General Goal 3. Provide data and other input to regional Mojave Desert conservation initiatives.

Goal. Inventory the NTC's and Fort Irwin's floral resources and monitor species or communities that are indicators of ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

Goal. Provide land managers and trainers with long-term assessments of changes in vegetative cover and botanical composition under varying levels and types of use.

Objective 1. Reallocate plots based on updated soils, vegetation, and training area maps.

Objective 2. Continue long-term monitoring on re-allocated plots during 2001 through 2004.

Objective 3. Use results from phases 1 and 2 for future ground-truthing analyses of new and existing remote sensing imagery.

Objective 4. Incorporate training activity data (from RFMSS and others) to link vegetation change to known military impacts.

Long Term Objective 5. Develop a model to predict effects of military training on vegetation.

Long Term Objective 6. Use remote sensing (with ground truthing) to determine effects of military training (i.e., change analysis).

Objective 7. Update the floral inventory as new species are found during LCTA surveys.

Objective 8. Provide LCTA data to regional Mojave Desert initiatives, particularly the Mojave Desert Ecosystem Program (MDEP).

Objective 9. Explore new technology (low-level aerial photography and scanning software) for conducting vegetation surveys.

Goal. Identify flora of the NTC & Fort Irwin as part of the natural resources baseline data.

Objective 1. Update the flora inventory (including herbarium mounts) as new species are found during LCTA surveys, site-specific surveys, sensitive plant species surveys, and other projects.

Objective 2. Provide floral data to regional Mojave Desert initiatives, particularly the MDEP.

Objective 3. Develop and maintain a computerized plant checklist.

Goal 1. Identify all populations of Lane Mountain Milkvetch and Lane Mountain Milkvetch habitat on the NTC & Fort Irwin and establish baseline milk vetch species population densities for each site.

Objective. Survey for Lane Mountain Milkvetch, both on and adjacent to the NTC & Fort Irwin.

Goal 2. Monitor other federal-listed plant species if they are discovered on the NTC & Fort Irwin or added to the list.

Objective. Consult with the USFWS and establish survey and monitoring programs for other federal-listed

plant species if they are discovered on the NTC & Fort Irwin or added to the list.

Goal 3. Monitor State-listed threatened, endangered, or species of concern plant species if they are discovered on the NTC & Fort Irwin or added to the list, as determined by available funding.

Objective 1. Identify all populations of alkali mariposa lily and its habitat on the NTC & Fort Irwin and establish a baseline of mariposa lily population densities for each site.

Objective 2. Identify all populations of Mohave monkey flower and its habitat on the NTC & Fort Irwin and establish a baseline of monkey flower population densities for each site.

Objective 3. Consider establishing survey and monitoring programs for State-listed plant species, in consultation with the CDFG, if they are discovered on the NTC & Fort Irwin or added to the list during 1999-2003.

Goal. Maintain a baseline database on wetland resources at the NTC & Fort Irwin.

Objective. Use site-specific surveys to evaluate wetland resources if potential wetland impacts are proposed.

Goal. Inventory the NTC's and Fort Irwin's faunal resources and regularly monitor species that are indicators of ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

Objective 1. Continue to inventory and monitor small mammals in conjunction with a study (Recht, 1997) to evaluate small mammals as indicators of the impacts of military training on desert habitats, at least through 1999.

Objective 2. Cooperate with the CDFG to monitor Nelson's bighorn sheep.

Objective 3. Survey the 10 spring areas, which includes critical foraging habitat for bats, at least once during the 1999-2003 to determine changes in bat populations in these areas (Chambers Group, Inc., 1998).

Objective 4. Evaluate the option to survey mines around the perimeter of the Training Center to locate Townsend's western big-eared bat maternity roosts (Brown, 1994).

Objective 5. Continue to add to the small mammal baseline inventory using observations and data from other field projects.

Objective 6. Continue to inventory and monitor birds in conjunction with a study (Brydolf, 1997) to evaluate birds as indicators of the impacts of military training on desert habitats, at least through 1999.

Objective 7. Survey the 10 spring areas that have been set aside as migratory bird habitat (Jack Springs, Garlic Springs, Bitter Springs, Leach Springs, Desert King Springs, Two Springs, Drinkwater Springs, Devouge Springs, Cave Springs, and one unnamed spring), which includes crucial habitat for many sensitive avian species, at least once during the 1999-2003 period to determine changes in migratory bird populations in these areas (Chambers Group, Inc., 1998).

Objective 8. Continue to add to the avian baseline inventory using observations and data from other field projects.

Objective 9. Continue to inventory and monitor reptiles in conjunction with studies (Morafka, 1997; Brown and Nagy, 1997) to evaluate reptiles as indicators of the impacts of military training on desert habitats, at least through 1999.

Objective 10. Determine the distribution of the Mojave fringe-toed lizard on the NTC & Fort Irwin and determine if the two known populations are genetically identical.

Objective 11. Continue to add to the amphibian and reptile baseline inventory using observations and data from other field projects.

Objective 12. Continue to inventory invertebrates in conjunction with a study (Pratt and Alley, 1997) to evaluate invertebrates as indicators of the impacts of military training on desert habitats, at least through 1999.

Objective 13. Develop an invertebrate species list from the Pratt and Alley study (1997) and observations and data from other field projects.

Goal 1. Identify all populations of desert tortoises and desert tortoise habitat on the NTC & Fort Irwin and establish a current baseline for tortoise population densities in management areas.

Objective 1. Survey the entire Southern Boundary, Goldstone, and other probable locations of desert tortoise habitat every five years (using one-fifth of the total acreage surveys each year) to determine desert tortoise population densities.

Objective 2. Survey potential relocation areas to determine areas of low tortoise populations to be used for translocation (see Section 9.5.2.2).

Goal 2. Continue research on upper respiratory tract disease as required in the Biological Opinion for the current mission at the NTC.

Objective 1. Continue research on the cause of the disease and possible cures.

Objective 2. Continue to develop an "in-the-field ELISA Test" for determining the presence of desert tortoises prior to relocation into possible non-upper respiratory tract disease-affected areas.

Goal 3. Initiate a long-term (25-year) life history study on the desert tortoise.

Objective 1. Initiate a long-term life history study on the NTC & Fort Irwin and in the proposed expansion area under the direction of the U.S. Geological Survey, Biological Resources Division, monitoring the effects of military training on the desert tortoise.

Objective 2. Initiate a long-term life history study at two Mohave Desert locations to be used as controls for life history studies on the NTC.

Goal 4. Initiate a long-term life history physiology study on the desert tortoise at the same locations as the life history studies.

Objective. Determine effects of military training on physiological parameters of healthy desert tortoises and upper respiratory tract disease-infected desert tortoises by measuring effects of upper respiratory tract disease on egg production, clutch size, survivorship, energy budgets, etc.

Goal 5. Increase the database on desert tortoise hatchlings and neonates by continuing research at the Fort Irwin Study Site.

Objective. Continue to fund predation rate studies by Dr. Morafka at the Fort Irwin Study Site. Studies will include determining appropriate release times from head-start pens and evaluating the viability of using head-start pens to aid in recovery of the desert tortoise in areas where they have been extirpated.

Goal 1. Identify all populations of willow/southwestern willow flycatchers, their habitat, and areas of potential use during migration on the NTC & Fort Irwin.

Objective. Inventory willow/southwestern willow flycatchers at the 10 spring areas that have been set aside as migratory bird habitat (Jack Springs, Garlic Springs, Bitter Springs, Leach Springs, Desert King Springs, Two Springs, Drinkwater Springs, Devouge Springs, Cave Springs, and one unnamed spring), which includes southwestern willow flycatcher crucial habitat, at least once during the 1999-2003 period.

Goal 2. Determine if willow/southwestern willow flycatchers are nesting on the Training Center or only utilizing areas on the installation for brief periods during migration.

Objective. Conduct nesting surveys for willow/southwestern willow flycatchers at the 10 spring areas at least once during the next five years.

Goal 1. Identify all populations of least Bell's vireos, their habitat, and areas of potential use during migration on the NTC & Fort Irwin.

Objective. Inventory least Bell's vireos at the 10 spring areas that have been set aside as migratory bird

habitat (Jack Springs, Garlic Springs, Bitter Springs, Leach Springs, Desert King Springs, Two Springs, Drinkwater Springs, Devouge Springs, Cave Springs, and one unnamed spring), which includes least Bell's vireo crucial habitat, at least once during the 1999-2003 period.

Goal 2. Determine if least Bell's vireos are nesting on the Training Center or only utilizing areas on the installation for brief periods during migration.

Objective. Conduct nesting surveys for least Bell's vireos at the 10 spring areas at least once during the next five years.

Goal. Identify all populations of Mohave ground squirrel and Mohave ground squirrel habitat on the NTC and establish a current base line ground squirrel population density for the various management areas.

Objective 1. Continue to conduct small mammal studies aimed at inventory and assessment of species as bioindicators to determine the distribution of the Mohave ground squirrel on the NTC & Fort Irwin by 1999.

Objective 2. Periodically survey for the Mohave ground squirrel throughout the NTC & Fort Irwin to determine changes in ground squirrel populations in specific areas (Chambers Group, Inc., 1998).

Objective 3. Implement a short-term life history study to determine which parameters determine emergence from hibernation, preferred food sources, and juvenile dispersion from burrows. These studies will be used to determine the standard protocol for monitoring the Mohave ground squirrel.

Goal. Determine the degree of use of the installation by the California black rail.

Objective. Conduct surveys to determine whether the black rails reported at the sewage treatment plant are occasional or rare winter visitors or constitute a small resident population.

Goal. Ensure compliance with water quality standards.

Objective. Determine the water quality at Garlic Springs during the next five years, and if funding is available, conduct water quality studies at other springs on the installation.

Goal. Use soil parameters to manage military activities, protect soil stability, rehabilitate training lands, and conserve wildlife habitat.

Objective 1. Use site-specific soil testing for natural resources programs such as training land rehabilitation and erosion control.

Objective 2. Use soil inventory data to make decisions regarding land use, rehabilitation options, and wildlife habitat management options.

Chapter 9. Natural Resources Management

Goal 1. Use coordinated planning to manage natural resources to sustain the military training capability.

Objective. Coordinate natural resources planning with planning for the sustainment of the military mission.

Goal 2. Promote and participate in regional planning for natural resources conservation at scales larger than the NTC & Fort Irwin.

Objective. Continue to coordinate with and support regional planning and programs, such as the Desert Tortoise Recovery Plan, California Desert Conservation Area Plan, West Mojave Coordinated Management Plan, Northern and Eastern Mojave Planning Effort, Mojave Desert Ecosystem Program, and the California Desert Manager's Group.

Goal 3. Use coordinated planning to fully integrate the natural resources program at the NTC & Fort Irwin.

Objective 1. Update the INRMP at least every five years or when major changes are made to the natural resources program. (This will require the next INRMP update to begin in 2003.)

Objective 2. Bi-annually update the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a), which has the following goals and objectives:

ITAM Goals

- Inventorying and monitoring land condition.
- Integrating training requirements with land capacity.
- Providing for land rehabilitation and maintenance.
- Educating land users to minimize impacts.
- Preserving natural and cultural resources.

ITAM Objectives

- Sustain training lands to ensure their availability to support training indefinitely.
- Establish an inventory of natural and cultural resource conditions to support the training mission.
- Plan, program, and execute both repair and maintenance projects and reconfigure and redesign training areas to support sustainment of the land.
- Monitor resource conditions and determine trends in those conditions.
- Educate land users to prevent avoidable damage to the land and minimize unavoidable damage resulting from training and other mission activities.

General Goal 1. Utilize ecological functions and landscape level planning to alter limiting factors and promote priority endemic species.

General Goal 2. Base species management priorities on conservation needs as defined by global, regional, and local abundance; distribution and threats; population trends; importance of areas to species; potential for population and/or habitat management; and human interests.

Goal. Maintain springs and seeps as essential components of the desert ecosystem.

Objective 1. Construct fences designed to exclude wild burros but allow access to desert bighorn sheep at springs in the Avawatz Mountains.

Objective 2. Actively remove invasive, non-native plant species from the vicinity of the springs. Section 9.11 further describes accomplishment of this objective.

Objective 3. Renovate and maintain Jack Spring (NK 220898), approximately 100 yards (91 m) south of the installation's southern border, and its associated wetlands in coordination with the BLM.

Objective 4. Implement repair recommendations in the 1997 spring evaluation report (U.S. Army, National Training Center and Fort Irwin, 1997b).

Goal. Provide artificial water sources for wildlife.

Objective 1. Locate all guzzlers and assess their condition.

Objective 2. Maintain or replace wildlife guzzlers in coordination with the CDFG.

Objective 3. Construct fences designed to exclude wild burros but allow access to desert bighorn sheep at guzzlers in the Avawatz Mountains.

Objective 4. Evaluate additional locations for guzzlers, particularly remote mountainous areas.

General Goal. Maintain wildlife populations at optimal levels in accordance with species priorities, population ecology, population health considerations, and habitat capacities.

Goal. Maintain game species to produce harvestable surpluses on a sustained basis.

Objective 1. Survey huntable populations of game species prior to each hunting season and use information

to establish hunting seasons.

Objective 2. Continue to provide hunting opportunities within CDFG regulations and requirements of the military mission at the NTC & Fort Irwin.

General Goal. At a minimum, maintain sensitive species populations (or migratory use) and their habitats at current levels with the long term goal of increasing species numbers and the size and distribution of quality habitats.

Goal 1. Establish/maintain off-limits crucial desert tortoise habitat areas that have the best quality habitat and highest known tortoise populations, are the most sensitive to disturbance and, consequently, are most sensitive to substantial loss of tortoise and/or tortoise habitat.

Objective 1. Maintain the off-limits status of desert tortoise critical habitat.

Objective 2. Maintain the two-strand barbed wire fence along the 90 UTM grid line and Manix tank trail to prevent vehicles from accidentally straying into the area.

Objective 3. Use Seibert stakes approximately every 30 meters along the 90 UTM grid line as an additional boundary marker and along both sides of Manix and Goldstone tank trails to further prevent traffic from widening or straying off trails.

Objective 4. Revegetate old tank trails that are no longer in use through the Southern Boundary area (see Section 9.8.1.1).

Objective 5. Use Range Control officials, following each rotation, to survey training area impacts and perform maintenance duties, such as repairing downed fences in off-limits areas and standardize and formalize the reporting system so repairs are made promptly.

Goal 2. Reduce injury and mortality of desert tortoises.

Objective 1. Consider establishing refugia for relocation at the following locations:

- the Two Springs area just south of Leach Lake,
- undisturbed areas of the Goldstone Complex (with Goldstone permission), and
- critical habitat along the southern boundary (south of the 90 UTM grid line), but only after it has been established that translocated tortoises are disease free.

Objective 2. Reduce take of desert tortoises due to straying of vehicles from approved routes of travel through establishment of clearly marked roadways and tank convoy routes.

Objective 3. Mark all off-limits management areas and relocation areas to identify them as desert tortoise habitat and management areas.

Objective 4. Post Manix and Goldstone tank trails with 20 mph speed limit signs.

Objective 5. Use Observer/Control Teams and Military Police lead observers to minimize harm to desert tortoises and damage to their habitats.

Goal 3. Effectively translocate tortoises.

Objective 1. Design a specific desert tortoise handling protocol based on the Desert Tortoise Council's 1994 Guidelines for handling desert tortoises.

Objective 2. Use only trained and authorized biologists participating in the desert tortoise translocation study to relocate tortoises, using specific handling and marking/tagging protocols, and only to relocation areas designated by the USFWS.

Objective 3. Use the post veterinary clinic to care for sick or injured desert tortoises, and provide a desert tortoise adoption service in conjunction with the Natural and Cultural Resources Section for tortoises that cannot be returned to the wild.

Goal 4. Establish/maintain education and training programs and well-defined operational procedures to

avoid injury or mortality of desert tortoises during training and other activities.

Objectives in Section 11.1.

Goal 5. Enlist support of the Commanding General and other senior officers in emphasizing the importance of compliance with operational procedures.

Goal 6. Reduce mortality of tortoises due to predation.

Objectives in Section 9.10.1.1.

Goal 7. Develop and implement a long-term desert tortoise management plan.

Objective 1. Support Department of Army efforts to develop a long-term management plan for the desert tortoise at the NTC & Fort Irwin.

Objective 2. When completed and approved, implement the desert tortoise management plan and ensure it is incorporated into the Endangered Species Management Plan.

Goal 1. Establish and maintain off-limits crucial willow/southwestern willow flycatcher habitat areas that have the best quality habitat, highest potential for use, highest known flycatcher populations or use, and are the most sensitive to disturbance.

Objective 1. Clearly mark off-limit areas, including all spring locations.

Objective 2. Use Range Control officials, following each rotation, to survey training area impacts and perform maintenance duties, such as repairing downed fences in off-limit areas.

Objective 3. Clear all spring and associated riparian locations of invasive, non-native vegetation (see Section 9.10.1.2).

Objective 4. Remove evidence of recent human occupation and use.

Objective 5. Restore and revegetate spring areas with native species.

Goal 2. Reduce take of willow/southwestern willow flycatchers.

Objective 1. Mark all off-limits springs to identify them as endangered species management areas.

Objective 2. Use Observer/Control Teams and Military Police lead observers to minimize damage to willow/southwestern willow flycatcher habitat.

Goal 1. Establish and maintain off-limits crucial least Bell's vireo habitat areas that have the best quality habitat, highest potential for use, highest known vireo populations or use, and are the most sensitive to disturbance.

Objective 1. Clearly mark off-limit areas, including all spring locations.

Objective 2. Use Range Control officials, following each rotation, to survey training area impacts and perform maintenance duties, such as repairing downed fences in off-limit areas.

Objective 3. Clear all spring and associated riparian locations of invasive, non-native vegetation (see Section 9.10.1.2).

Objective 4. Remove evidence of recent human occupation and use.

Objective 5. Restore and revegetate spring areas with native species.

Goal 2. Reduce take of least Bell's vireos.

Objective 1. Mark all off-limits springs to identify them as endangered species management areas.

Objective 2. Use Observer/Control Teams and Military Police lead observers to minimize damage to least Bell's vireo habitat.

Goal 1. Establish and maintain off-limits Lane Mountain milk vetch habitat.

Objective 1. Clearly mark off-limit areas.

Objective 2. Use Range Control officials, following each rotation, to survey training area impacts and perform maintenance duties, such as repairing downed fences in off-limit areas.

Goal 2. Minimize take of Lane Mountain Milkvetch.

Objective 1. Mark all Lane Mountain Milkvetch off-limits areas to identify them as endangered species management areas.

Objective 2. Use Observer/Control Teams and Military Police lead observers to minimize damage to Lane Mountain milk vetch habitat.

General Goal. Consider State-protected species in all Army actions, per Army Regulation 200-2.

Goal 1. Use measures established for federal-listed species to provide protection for the Mohave ground squirrel.

Objective. Implement measures to protect critical and crucial habitat and reduce take for the desert tortoise, willow/southwestern willow flycatcher, Least Bell's vireo, and Lane Mountain Milkvetch (sections 9.5.2.2, 9.5.2.3, 9.5.2.4, and 9.5.2.5, respectively). Since these habitats are also valuable habitat for the Mohave ground squirrel and the take minimization measures will also benefit the ground squirrel.

Goal 2. Establish additional refugia for the Mohave Ground Squirrel

Objective. Record all Mohave ground squirrel observations on the NTC & Fort Irwin and establish data as a GIS layer.

Goal. Use measures established for federal-listed species to provide protection for possible habitat for the alkali mariposa lily.

Objective. Implement measures to protect crucial habitat for the willow/ southwestern willow flycatcher and least Bell's vireo (sections 9.5.2.3 and 9.5.2.4) since these habitats may be occupied by the alkali mariposa lily.

Goal. Use measures established for other sensitive species to provide protection for possible habitat for the Mohave monkey flower.

Objective 1. Implement measures to protect critical and crucial habitat for the desert tortoise and Lane Mountain Milkvetch (sections 9.5.2.2 and 9.5.2.5, respectively) since these habitats may be occupied by the Mohave monkey flower.

Objective 2. Minimize maneuver training in areas with slopes greater than 20%.

Goal. Use measures established for federal-listed species to provide protection for birds that use the NTC & Fort Irwin.

Objective. Implement measures to protect critical and crucial habitat and minimize take for the desert tortoise, willow/southwestern willow flycatcher, Least Bell's vireo, and Lane Mountain Milkvetch (sections 9.5.2.2, 9.5.2.3, 9.5.2.4, and 9.5.2.5, respectively). Since these habitats are also valuable habitat for birds in general, and the take minimization measures will also benefit many bird species.

Goal 1. Use measures established for federal-listed species to provide protection for bats that use the NTC & Fort Irwin.

Objective 1. Implement measures to protect and maintain crucial habitat for the willow/southwestern willow flycatcher and Least Bell's vireo (sections 9.5.2.3 and 9.5.2.4) since spring habitats are also valuable foraging habitat for bats.

Objective 2. Emphasize Drinkwater, Bitter, Desert King and Garlic springs (needing significant renovation) with regard to protecting bat foraging sites (Brown, 1994).

Goal 2. Identify and protect bat roosting and maternity sites.

Objective 1. Establish/maintain off-limits bat habitat areas that have the highest known populations and best

quality habitat for bats.

Objective 2. Install bat gates that are specific to suspected species at mine openings, using recommendations from Brown (1994), to prevent human activity in mines, which can have a detrimental affect on bat populations on the NTC & Fort Irwin.

Objective 3. Continue to minimize training in areas with greater than 20% slopes to protect cliff faces that are roosting sites for bats.

Goal: Manage wetlands to ensure "no net loss" per Executive Order 11990.

Objective 1. Use the environmental review process to protect wetlands.

Objective 2. Regularly inspect springs on both a formal and opportunistic basis.

Objective 3. Provide certified jurisdictional wetland delineations (and permit application, if necessary) if a project is planned in a suspected wetland.

Objective 4. Work with troop units to ensure compliance with spring protection provisions within Range Regulation 350-3, using the ITAM Office Environmental Awareness program.

Goal. Protect surface water quality in NTC & Fort Irwin springs.

Objective 1. Control or eliminate runoff and erosion that could affect springs.

Objective 2. Consider non-point source pollution abatement in construction, installation operations, and land management plans and activities.

Goal 1. Select, prioritize, and design projects to return damaged areas to full training support capability.

Objective 1. Separate projects within the erosion control plan (MacAller *et al.*, 1998) into those eligible for LRAM funding and those eligible for environmental funding.

Objective 2. Use the erosion control plan (MacAller *et al.*, 1998) to initially select sites for LRAM projects.

Objective 3. Prioritize sites based on concepts within the erosion control plan (MacAller *et al.*, 1998).

Objective 4. Design projects for priority sites using general recommendations within the erosion control plan (MacAller *et al.*, 1998) as well as experience gained from other projects developed on the NTC & Fort Irwin.

Objective 5. Schedule and budget LRAM projects using updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a).

Goal 2. Rehabilitate damaged areas to the point where they can fully support military activities.

Objective 1. Use troop engineer units, private contractors, and the ITAM field crew to implement LRAM projects.

Objective 2. Continue to test erosion control techniques that appear to be suited to problems encountered at the Training Center.

Goal 3. Minimize damage and revegetation costs.

Objective. Use trail closure and trail definition to reduce damaged areas, protect sensitive resources, and improve troop safety.

Goal 4. Provide feedback to improve the design and implementation efficiency of LRAM projects via adaptive management.

Objective 1. Use inhouse resources to monitor individual LRAM projects for at least five years following project implementation.

Objective 2. Use the GIS to connect tabular databases to each LRAM project, indicating purpose, dates, techniques, success, and problems encountered, to improve the feedback mechanism.

Objective 3. Use experience gained from monitoring (qualitative and quantitative) to improve the design and implementation of future LRAM projects.

Goal. Control dust for improved military mission accomplishment, enhanced human safety, and reduced environmental impacts.

Objective 1. Continue to identify and prioritize critical areas near the cantonment area and major tank trails for dust control projects. Schedule and budget dust control projects using updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a).

Objective 2. Implement dust control (chemical stabilization) on priority sites with the amount treated based on available funding.

Objective 3. If new technologies or products become available that appear to be feasible and cost-effective for the NTC & Fort Irwin, test these products and use results to improve the dust control program.

Goal. Provide high quality stocks of locally adapted seed and plants to support revegetation projects on the NTC & Fort Irwin.

Objective 1. Use annual updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a) to determine native plant and seed stock requirements at least two years in advance.

Objective 2. Acquire locally adapted native seed.

Objective 3. Store seed and maintain seed quality.

Objective 4. Send seed to nurseries with Mojave Desert native plant experience for propagation.

Objective 5. Monitor the seed collection and propagation program and use results to improve the program in terms of collection processes, propagation techniques, and success in revegetation projects.

Goal. Identify sensitive areas, nonmilitary use areas, and human safety hazardous areas to military personnel using the NTC & Fort Irwin range areas.

Objective 1. Construct and install Seibert stakes to mark sensitive areas, nonmilitary use areas, and human safety hazard areas using annual updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a) to identify and prioritize projects.

Objective 2. Maintain existing Seibert stakes, including removal of stakes no longer required.

Goal. Improve the LRAM program using applied desert restoration studies.

Objective 1. Continue long-term monitoring for input into the LRAM decision model.

Objective 2. Complete the cryptogamic crust study (U.S. Army, National Training Center and Fort Irwin, 1997a) by 1999 and implement results to improve the LRAM program.

Objective 3. Complete the soil fertilization study (U.S. Army, National Training Center and Fort Irwin, 1997a) by 1999 and implement results to improve the LRAM program.

Objective 4. Complete the grass revegetation study by 2000 and implement results to improve the LRAM program.

Objective 5. Complete the soil hydrology study by 1999 and implement results to improve the LRAM program.

Objective 6. As promising new techniques potentially valuable to the NTC & Fort Irwin LRAM program are discovered, use applied studies to evaluate their usefulness to the program.

Goal. Maintain an aesthetically pleasing cantonment area landscape that maintains natural ecosystem functions as much as possible.

Objective 1. Implement the landscape planting plan.

Objective 2. Provide professional advice to guide the grounds landscaping and maintenance program toward the use of native species and drought-tolerant species.

Objective 3. Use drip irrigation as much as possible when irrigation is required.

Goal. Control pest animals to support the military mission, promote sustained ecosystem functionality, favor native species biodiversity, and add to the quality of life of the NTC & Fort Irwin community.

Objective 1. Promptly place all trash generated at bivouac or training areas in covered containers and remove for disposal at the NTC & Fort Irwin landfill when the training unit leaves the area.

Objective 2. Place tarpaulins over trash in the vehicles that haul material to the landfill.

Objective 3. Cover the active area of the landfill with at least six inches of topsoil during daily operations and at the end of the day to reduce the site's attractiveness to coyotes.

Objective 4. Continue to educate soldiers and other personnel about the importance of proper disposal of unused food items and other refuse.

Objective 5. Control raven numbers, based on a study (USGS, Biological Resources Division) of the status and trends of raven populations and their potential impacts on the desert tortoise populations on the NTC & Fort Irwin, in cooperation with USFWS and CDFG. Ravens will be trapped with use of rocket nets.

Objective 6. Conduct raven population surveys and nest surveys in 1999.

Objective 7. By 1999 provide burro exclusions (allowing bighorn sheep entry) on springs in areas frequented by burros.

Objective 8. By 1999 use helicopter roundups and traps at water sites, particularly at Leach Springs and Two Springs, to provide Fort Irwin's part of the 200 burros per month quota for the combined agencies' areas.

Objective 9. Use periodic roundups and trapping to remove burros until all are removed and maintain this zero status with removal as required.

Objective 10. Relocate problem rattlesnakes to range areas.

Goal. Control noxious and invasive, exotic plants to support the military mission, promote sustained ecosystem functionality, favor native species biodiversity, and add to the quality of life of the NTC & Fort Irwin community.

Objective 1. Map the distribution and abundance of non-native, invasive species (e.g., *Tamarix ramosissima*, *Salsola tragus*).

Objective 2. Prioritize sites that require invasive plant management (e.g., springs, see Section 9.5.2.3).

Objective 3. Develop an action plan for exotic plant control on the Training Center, including the above-listed map and priority sites, a rating of each species for its difficulty of control, methods of control for all species based on their respective life histories, and a description of means used by each species to spread from site to site.

Objective 4. Conduct an applied study of mechanical and chemical Russian thistle control as part of a revegetation project, implement the project in 2000.

Objective 5. Continue to seek funding for exotic weed control.

Goal. Meet Department of Army Measures of Merit for pest management programs on Army installations.

Objective 1. Annually review the Pest Management Plan (Quillman, 1997). Incorporate updates into the plan on a five-year cycle.

Objective 2. Emphasizing integrated pest management techniques to continue to minimize the use of pesticides.

Objective 3. Ensure contractor personnel are State-certified applicators.

Goal 1. Use pesticides in a manner to minimize impacts to sensitive animal and plant species.

Objective 1. Follow precautionary statements on labels regarding contamination of water when pesticides are

sprayed near wetlands.

Objective 2. Take special precautions during pest management activities that could affect endangered species or species of concern, particularly by using non-chemical treatments in areas with Mohave ground squirrels.

Goal 2. Minimize environmental risks to human health while conducting pest management programs.

Objective. Ensure that personnel dealing with rodent control are aware of the potential for hantavirus and take appropriate precautions to avoid exposure.

Goal. Provide protection for lands and natural resources from wildfires.

Objective 1. Require all troop units and other installation personnel to report wildfires as soon as possible.

Objective 2. Respond to wildfires as soon as possible and begin immediate suppression, consistent with safety related to unexploded ordnance.

Objective 3. Suppress wildfires as soon as possible.

Objective 4. Incorporate burn areas as a GIS data layer for tracking and possible rehabilitation.

Objective 5. Investigate the potential value and costs associated with the establishment of firebreaks around high risk areas.

Objective 6. Determine methods for treatment of burn areas to reduce invasion by exotic species.

Goal. Provide protection for areas of special ecological concern.

Objective 1. Use project review and the NEPA process to protect special interest areas.

Objective 2. Use GIS to identify areas of special interest to natural and cultural resources managers, project planners, military planners, and personnel using the NTC & Fort Irwin.

Objective 3. Recognize springs and associated buffer areas of at least 220 yards (200 m) as off-limits.

Objective 4. Erect fencing, metal crossbars, signs, and Seibert stakes (see Section 9.8.1.4) at portions of these springs likely to be approached by wheeled and tracked vehicles to reduce accidental intrusion into and subsequent damage to these resources. Check fences around springs for damage after each rotation and repair or replace fencing, signage, or Seibert stakes as needed.

Objective 5. Educate field personnel about the off-limits nature of spring locations as part of major briefings prior to each military exercise to avoid impacts by military equipment and personnel on natural and cultural resources associated with spring areas.

Objective 6. Designate playas (except Red Pass Lake, Bicycle Lake airstrip, and Langford Lake) as off-limits to be avoided by military personnel because of potential impacts to associated biological and cultural resources.

Objective 7. Require approval from the Natural and Cultural Resources Section for removal of Joshua trees in proposed project footprints.

Objective 8. If removal is necessary, re-locate trees to sites with the same orientation and similar characteristics as their original sites to reduce the risk of tree mortality.

Goal. Integrate NTC and Fort Irwin training requirements for land use with the sustained capability of the land to support such use.

Objective 1. Assist military mission planners and scenario writers using visualization tools and overlays on imagery.

Objective 2. Use training restrictions, when required, to protect sensitive natural resources and minimize damage to training areas.

Objective 3. Ensure that environmental regulations and restrictions to training have command support.

Chapter 10. Enforcement

Goal. Assure legal compliance of military and civilian activities with regard to natural and cultural resources on the NTC & Fort Irwin.

Objective 1. Maintain a law enforcement program for military and civilian activities on the NTC & Fort Irwin range areas.

Objective 2. Coordinate enforcement activities with other agencies, particularly the CDFG.

Objective 3. Train the Natural and Cultural Resources Manager and the Archeologist in enforcement of the Archeological Resources Protection Act, using a BLM-sponsored course.

Chapter 11. Awareness

General Goal 1. Provide information to soldiers and civilians so they remain safe while they are at the Training Center.

General Goal 2. Educate users to minimize impacts to the land and natural resources to maintain and enhance training.

Goal 1. Educate military personnel and civilians associated with military training to minimize impacts to the land and resources to maintain and enhance training.

Objective 1. Revise the Leader's Handbook, Soldier's Field Card, posters, training CDS, and other environmental awareness materials to keep information current, using the following priorities (U.S. Army, National Training Center and Fort Irwin, 1997a):

- FY 99 - Develop, revise, and update maps and training materials and produce a training/environmental video for export to rotational troop units.
- FY 00 - Sustain training materials.

Objective 2. Develop an in-processing brief and a quarterly post brief to emphasize better integration of environmental concerns at the incoming soldier level as well as within the civilian employee sector to inform all users of the post as to the natural resources upon which the training success of the Training Center ultimately rests.

Objective 3. Provide briefings and educational materials to Training Center units, rotational units, and Army National Guard and Reserve Component units.

Objective 4. Schedule and budget ITAM Environment Awareness projects using updates of the ITAM 5 Year Plan (U.S. Army, National Training Center and Fort Irwin, 1997a).

Objective 5. Periodically publish information booklets similar to the Rock Art booklet.

Goal 2. Establish/maintain education and training programs and well-defined operational procedures to avoid injury or mortality of desert tortoises and other sensitive species during training and other activities.

Objective 1. Develop education programs, which will increase awareness of the desert tortoise and its habitat among all personnel on the NTC & Fort Irwin.

Objective 2. Use established training avenues to increase awareness of requirements to protect sensitive species on the NTC & Fort Irwin.

Objective 3. Include enlisted personnel in the OPFOR Academy training program.

Objective 4. Develop brochures for venomous animal awareness and spring protection.

Objective 5. Develop a cooperative approach to species/habitat protection and continue to stress the importance of reporting.

Goal 1. Provide an understanding of the NTC & Fort Irwin natural resources program to installation and

surrounding communities.

Goal 2. Provide information to soldiers, civilian employees, and other installation users to improve their understanding of impacts of their activities on the environment.

Objective 1. Use the printed media, both on- and off-post, as an important part of natural resources management on the NTC & Fort Irwin.

Objective 2. After coordination with the Public Affairs Office, provide support to the electronic media in preparation of television or radio programs involving natural resources on the Training Center.

Objective 3. Whenever personnel are available, provide tours of the NTC & Fort Irwin to interested groups, such as the Desert Explorers.

Objective 4. Continue to participate in local events with natural resources significance, particularly those associated with Earth Day and appreciation of the armed forces.

Objective 5. Work with youth groups whenever possible as a good investment in the future.

Objective 6. Maintain and enhance educational opportunities at the Desert Tortoise Education Facility.

Objective 7. Provide a "visitor-activated" audio description of the tortoise life cycle and other information for the Desert Tortoise Education Facility.

Goal. Sponsor and participate in opportunities to provide information regarding NTC & Fort Irwin natural resources programs and similar programs elsewhere.

Objective 1. Consider sponsoring other Mojave Desert Research Symposia or similar events, depending on available resources.

Objective 2. Actively participate in training sessions, such as the annual ITAM Workshop (see Section 16.2.2).

Objective 3. Author/co-author papers for scientific journals presenting research/project results.

Chapter 12. Outdoor Recreation

General Goal 1. Provide opportunities for the NTC & Fort Irwin community to participate in high quality, safe outdoor recreation.

General Goal 2. Manage outdoor recreation consistent with needs of the NTC & Fort Irwin military mission.

General Goal 3. Integrate recreation activities with natural resources stewardship and compliance.

Goal. Provide highly controlled access to the NTC & Fort Irwin for natural resources recreation, in accordance with Army policies.

Objective. Continue NTC & Fort Irwin policies toward public access.

Goal. Provide quality hunting opportunities on the NTC & Fort Irwin, consistent with requirements to avoid conflicts with the military mission and provide for safe hunting conditions.

Objective 1. Implement provisions within NTC Reg. 420-3.

Objective 2. Implement surveys to monitor impacts of hunting.

Goal. Plan for a cohesive, integrated natural resources recreation program on the NTC & Fort Irwin.

Objective 1. Compare existing recreational opportunities with those identified in the completed survey to identify additional potential recreational opportunities within constraints of the Training Center military mission.

Objective 2. Develop general policies and regulations that are consistent for all recreational uses on the NTC

& Fort Irwin to avoid confusion by various user groups.

Objective 3. Develop recreation-specific requirements, such as those outlined for the Desert Explorers Club, for each user group.

Objective 4. Develop an Outdoor Recreation Cooperative Plan that summarizes all available outdoor recreational opportunities, which includes requirements for all recreational uses and each outdoor recreation type and addresses the following for each recreation type:

- off-limits areas,
- required permits and regulations,
- seasonal use requirements,
- potential natural hazards, and
- planning and coordination requirements.

Goal. Provide quality opportunities for natural resources-based outdoor recreation.

Objective 1. Continue and enhance opportunities for outdoor recreation involving natural resources at the Training Center.

Objective 2. Evaluate proposals for a new location for the Riding Stable, which could have significant impacts on natural resources management, depending on the selected site.

Objective 3. Develop recreational vehicle sites to include full hookups, a comfort station, picnic area, and other amenities, using appropriate NEPA documentation, by 2000.

Chapter 13. Cultural Resources Protection

Goal. Implement this INRMP in a manner consistent with the protection of cultural resources at the NTC & Fort Irwin.

Objective 1. Implement provisions of the Integrated Cultural Resources Management Plan that relate to natural resources management.

Objective 2. Consider natural resources projects when planning cultural resources surveys, and use results of cultural resources surveys to plan natural resources projects.

Objective 3. Conduct listed species surveys and, if required, consultation for proposed cultural resources mitigation sites.

Objective 4. Avoid or mitigate adverse effects to cultural resources from natural resources through proper review and planning. Submit proposed projects, as part of NEPA review, to the CRM for approval, determinations of effect, and Section 106 consultation, as necessary.

Objective 5. Maximize use of GIS archeological information in planning and implementing LRAM projects.

Objective 6. Take the following protective measures upon discovery of sites.

- Cease ground disturbing activities immediately and report to the CRM upon discovery of potential cultural deposits.
- Consider alternatives for moving the project to another location.
- If remains are determined by the CRM to be natural, do no further investigation and resume the project. Protect the site until such time that it is determined ineligible for the NRHP if remains are determined to be cultural.

Objective 7. Use natural resources techniques and projects to protect cultural resources sites.

Chapter 14. National Environmental Policy Act

Goal 1. Use NEPA to identify projects and activities on the NTC & Fort Irwin which might impact natural resources and work with project planners to resolve issues early in the planning process.

Goal 2. Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA.

Goal 3. Help the NTC & Fort Irwin comply with NEPA.

Objective 1. Document effects of implementation of this INRMP through an EA that is embedded in this document.

Objective 2. Reference this INRMP/EA in descriptions of affected environment to reduce verbiage in other NEPA documents.

Objective 3. Classify mitigation as a "must fund" for budgetary purposes.

Objective 4. Conduct an informational brief on NEPA purpose and process for appropriate command level personnel to inform them of the benefits, requirements, and importance of NEPA.

Chapter 16. Implementation

Goal. Provide staffing of natural resource management professionals required to effectively manage natural resources on the NTC & Fort Irwin (U.S. Army, 1995).

Objective. Provide staffing for the NTC & Fort Irwin natural resources program as indicated in the above discussion.

Goal. Provide for the training of natural resources personnel (U.S. Army, 1995).

Objective. Implement the above described personnel training program for the NTC & Fort Irwin.

Goal 1. Provide external specialized skills and resources to support the NTC & Fort Irwin natural resources management.

Goal 2. Provide external personnel to assist with the management of certain aspects of the NTC & Fort Irwin natural resources program.

Objective 1. Implement external support projects.

Objective 2. Consider using IPA agreements as a source of personnel assistance.

Objective 3. Use ORISE as an important option for personnel assistance.

Objective 4. Maintain the option to use the Student Conservation Association and the California Conservation Corps for assistance with field projects.

Objective 5. Use volunteers as an opportunistic source of assistance.

Objective 6. Use universities, particularly California State University Dominguez Hills (ground squirrel survey), University of California Los Angeles (plant surveys), University of California Riverside (invertebrates), San Diego State University (ITAM), John Carroll University, Ohio (cryptogamic crusts and revegetation), and the University of Nevada, Reno (soil hydrology), to assist with implementation of this INRMP.

Objective 7. Use contractors to assist with implementation of this INRMP.

Objective 8. Use State and Federal agencies, particularly this INRMP's signatory partners, the USFWS and CDFG, and BLM, to assist with implementation of this INRMP.

Goal. Store, analyze, and use data in an efficient, cost-effective manner.

Objective 1. Upgrade hardware and software as needed during the next five years.

Objective 2. Develop a list of database needs for the NTC & Fort Irwin and develop or obtain these

databases.

Objective 3. Provide appropriate databases to MDEP, other regional initiatives, and other potential users using a local area network and a wide area network by 1999.

Objective 4. Attach tabular data to spatial data layers, such that a "point and click" provides such data on the spot.

Objective 5. Provide GIS databases via ArcView® to all pertinent Environmental Division personnel.

Objective 6. Make more use of the analytical capabilities of the NTC & Fort Irwin GIS to provide natural resources management options.

Objective 7. Create user-friendly interfaces to enable a wider use of GIS databases specific to the needs of installation users.

Objective 8. Develop a dedicated GIS laboratory with enhanced funding (including other than ITAM), equipment, and personnel to service the needs of the total installation.

Objective 9. Use remote imagery for improved decision-making for military activities, ITAM implementation, environmental management, and natural and cultural resources management and protection.

Objective 10. Obtain additional color, digital orthophotographs at 0.5-meter resolution to "square-off" the existing rectangle, described above.

Objective 11. Obtain color, infrared imagery for vegetative monitoring during the next good rainfall year at 1-meter resolution.

Objective 12. Obtain historic satellite imagery of the installation during past wet years (other El Nino years) for comparisons of the effects of this important phenomenon on installation vegetation.

Objective 13. Complete the remote sensing project (Lee *et al.*, 1997) by 2000.

Objective 14. Determine potential for use of hyperspectral imagery to enhance vegetation and change detection analyses.

APPENDIX 17.8: Finding of No Significant Impact

FINDING OF NO SIGNIFICANT IMPACT

INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT NATIONAL TRAINING CENTER AND FORT IRWIN, CALIFORNIA

1. **Description of Action.** The National Training Center and Fort Irwin proposes to implement an Integrated Natural Resource Management Plan at Fort Irwin, California for the period 2001-2005 to manage natural resources, support the military mission, provide outdoor recreation opportunities, and comply with various environmental laws.

Implementation will be ongoing operations over the five-year period using both inhouse and external personnel. The primary thrust of the program will be to survey and monitor natural resources and implement programs to conserve and manage them in a proactive manner, complying with environmental laws and regulations.

2. **Anticipated Environmental Effects.** The only adverse impacts identified were temporary increases in soil erosion during land rehabilitation and revegetation. Potential negative impacts would be more than offset by positive impacts of implementing this Integrated Natural Resources Management Plan. No adverse impact is expected to occur to any federally-listed threatened or endangered plant or animal species.

No significant adverse environmental impacts are anticipated for air quality, geology, soils, water quality, biological resources, or cultural resources. This proposed action will positively impact most of these resources. The action will not disproportionately affect any minority or disadvantaged group.

3. **Conclusions.** Based on a review of the information contained in Environmental Assessment portions of the Integrated Natural Resources Management Plan, it is concluded that implementation of the National Training Center and Fort Irwin Integrated Natural Resources Management Plan is not a major federal action which would significantly affect the quality of the environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended. Accordingly, the preparation of an Environmental Impact Statement for this proposed action is not required.
4. **Point of Contact.** Requests for further information or submittal of public comments may be made for 30 days after first publication date to:

Commander, NTC & Fort Irwin
Directorate of Public Works
ATTN: AFZJ-PW-EV, PO Box 105097
Fort Irwin, CA 92310-5097
Telephone (760) 380-3740

Reviewed by:

Approved by:



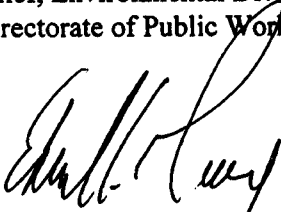
W. M. QUILLMAN
Natural and Cultural Resources Manager
Directorate of Public Works



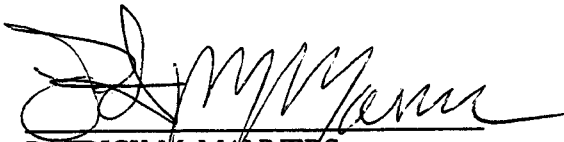
JAMES D. THURMAN
Brigadier General, U.S. Army
National Training Center and Fort Irwin
Fort Irwin, California 92310-5001



MUHAMMAD A. BARI
Chief, Environmental Division
Directorate of Public Works



EDWARD C. GULLY
Lieutenant Colonel, U.S. Army
Director, Public Works



PATRICK M. MANNERS
Lieutenant Colonel, U.S. Army
G-3



ROBERT M. ALGERMISSEN
Lieutenant Colonel, U.S. Army
Garrison Commander